**THE ASSAM DOWN TOWN UNIVERSITY**

**SCHOOL OF COMPUTING SCIENCES**

**5 YRS INTEGRATED MCA SPECIALIZATION IN (CLOUD TECHNOLOGY &**

**INFORMATION SECURITY)**

**Course Matrix**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **YEAR – I SEMESTER - I** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| **1** | **Theory** | MCA101 | Introduction to WEB Technology | **3** | **0** | **0** | **3** |
| **2** | MCA102 | Fundamentals of Mathematics | **3** | **1** | **0** | **4** |
| **3** | MCA103 | Computer Fundamentals and Organization | **3** | **1** | **0** | **4** |
| **4** | MCA104 | Introduction to Unix and Linux | **3** | **0** | **0** | **3** |
| **5** | MCA105 | Communication Skills-I | **3** | **0** | **0** | **3** |
| **6** | MCA106 | Programming in C | **3** | **0** | **0** | **3** |
| **7** | **Practical** | MCA116 | Programming in C Laboratory | **0** | **0** | **3** | **2** |
| **8** | MCA114 | Introduction to Unix and Linux Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **18** | **2** | **6** | **24** |
| **Cumulative contact Hours and credits** | | | | **18** | **2** | **6** | **24** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **YEAR – I SEMESTER - II** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| **1** | **Theory** | MCA201 | Communication Skills-II | **3** | **0** | **0** | **3** |
| **2** | MCA202 | Operating Systems | **3** | **0** | **0** | **3** |
| **3** | MCA203 | OOPS With C++ | **3** | **0** | **0** | **3** |
| **4** | MCA204 | System configuration and Maintenance | **3** | **0** | **0** | **3** |
| **5** | MCA205 | Security Threats and Trends | **3** | **0** | **0** | **3** |
| **6** | MCA206 | Data Structures using C | **3** | **0** | **0** | **3** |
| **7** | **Practical** | MCA213 | OOPS With C++ Laboratory | **0** | **0** | **3** | **2** |
| **8** | MCA216 | Data Structures using C Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **18** | **0** | **6** | **22** |
| **Cumulative contact Hours and credits** | | | | **36** | **2** | **12** | **46** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **YEAR – II SEMESTER - III** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| **1** | **Theory** | MCA301 | Storage Management | **3** | **0** | **0** | **3** |
| **2** | MCA302 | Information security -1 | **2** | **0** | **0** | **2** |
| **3** | MCA303 | Relational Database Management Systems | **3** | **0** | **0** | **3** |
| **4** | MCA304 | Programming in Java | **3** | **0** | **0** | **3** |
| **5** | MCA305 | Computer Networks | **3** | **0** | **0** | **3** |
| **6** | MCA306 | Software Engineering | **3** | **0** | **0** | **3** |
| **7** | **Practical** | MCA313 | Relational Database Management Systems Laboratory | **0** | **0** | **3** | **2** |
| **8** | MCA314 | Programming in Java - Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **17** | **0** | **6** | **21** |
| **Cumulative contact Hours and credits** | | | | **53** | **2** | **18** | **67** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **YEAR – II SEMESTER-IV** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| **1** | **Theory** | MCA401 | Introduction to Public Speaking | **3** | **0** | **0** | **3** |
| **2** | MCA402 | Routing | **3** | **0** | **0** | **3** |
| **3** | MCA403 | OSI layer and Network Protocols | **3** | **0** | **0** | **3** |
| **4** | MCA404 | Cryptography | **3** | **0** | **0** | **3** |
| **5** | MCA405 | Principles of Virtualization | **3** | **0** | **0** | **3** |
| **6** | MCA406 | Desktop Operating System | **3** | **0** | **0** | **3** |
| **7** | **Practical** | MCA412 | Routing Laboratory | **0** | **0** | **3** | **2** |
| **9** | MCA416 | Desktop Operating System Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **18** | **0** | **6** | **22** |
| **Cumulative contact Hours and credits** | | | | **71** | **2** | **24** | **89** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **YEAR – III SEMESTER - V** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| **1** | **Theory** | MCA501 | Reasoning and Thinking -I | **3** | **0** | **0** | **3** |
| **2** | MCA502 | Data Centre Fundamentals | **3** | **0** | **0** | **3** |
| **3** | MCA503 | Network Security | **3** | **0** | **0** | **3** |
| **4** | MCA504 | Installation and Configuration of Server | **3** | **0** | **0** | **3** |
| **5** | MCA505 | IT Governance Risk and Information Security Management | **3** | **0** | **0** | **3** |
| **6** | MCA506 | Introduction to Cloud Computing | **3** | **0** | **0** | **3** |
| **7** | **Practical** | MCA513 | Network Security Laboratory | **0** | **0** | **3** | **2** |
| **8** | MCA514 | Installation and Configuration of Server - Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **18** | **0** | **6** | **22** |
| **Cumulative contact Hours and credits** | | | | **89** | **2** | **30** | **111** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **YEAR-III SEMESTER-VI** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| **1** | **Theory** | MCA601 | Administration of Server | **3** | **0** | **1** | **4** |
| **2** | MCA602 | Ethical Hacking | **3** | **0** | **0** | **3** |
| **3** | MCA603 | Virtualization and Cloud Security | **3** | **0** | **0** | **3** |
| **4** | MCA604 | Linux Server Administration | **3** | **0** | **0** | **3** |
| **5** | MCA605 | Advanced Storage Management | **3** | **0** | **0** | **3** |
| **6** | MCA606 | Mobile Wireless and VoIP Security | **3** | **0** | **0** | **3** |
| **7** | **Practical** | MCA614 | Linux Server Administration - Laboratory | **0** | **0** | **3** | **2** |
| **8** | MCA612 | Ethical Hacking Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **18** | **0** | **7** | **23** |
| **Cumulative contact Hours and credits** | | | | **107** | **2** | **37** | **134** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **YEAR-IV SEMESTER-VII** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| **1** | **Theory** | MCA701 | Reasoning and Thinking- II | **3** | **0** | **0** | **3** |
| **2** | MCA702 | Database Security | **3** | **0** | **0** | **3** |
| **3** | MCA703 | Advanced Routing | **3** | **0** | **0** | **3** |
| **4** | MCA704 | Advanced Virtualization | **3** | **0** | **0** | **3** |
| **5** | MCA705 | Elective I | **3** | **0** | **0** | **3** |
| **6** | MCA706 | Disaster Recovery and Business Continuity Management | **3** | **0** | **0** | **3** |
| **7** | **Practical** | MCA713 | Advanced Routing Laboratory | **0** | **0** | **3** | **2** |
| **8** | MCA714 | Advanced Virtualization Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **18** | **0** | **6** | **22** |
| **Cumulative contact Hours and credits** | | | | **125** | **2** | **43** | **156** |

**Elective – I**

1. Hacktivism Cyber Warfare and Cyber Terrorism
2. Designing Enterprise Network - III

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **YEAR-IV SEMESTER-VIII** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credit** |
| **L** | **T** | **P** |
| **1** | **Theory** | MCA801 | Employability Skills | **3** | **0** | **0** | **3** |
| **2** | MCA802 | Cyber Forensics | **3** | **0** | **0** | **3** |
| **3** | MCA803 | Cloud Web Services | **3** | **0** | **0** | **3** |
| **4** | MCA804 | Advanced Network Security | **3** | **0** | **0** | **3** |
| **5** | MCA805 | Elective II | **3** | **0** | **0** | **3** |
| **6** | MCA806 | Advanced installation and configuration of Server | **2** | **0** | **0** | **2** |
| **7** | **Practical** | MCA816 | Advanced installation and configuration of Server Laboratory | **0** | **0** | **3** | **2** |
| **8** | MCA812 | Cyber Forensics - Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **17** | **0** | **6** | **21** |
| **Cumulative contact Hours and credits** | | | | **142** | **2** | **49** | **177** |

**Elective – II**

1. Application , Web Security and SDLC
2. Firewall IDs and IPS

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **YEAR-V SEMESTER-IX** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| **1** | **Theory** | MCA901 | Professional Skills | **3** | **0** | **0** | **3** |
| **2** | MCA902 | Information Technology Infrastructure Library (ITIL) | **3** | **0** | **0** | **3** |
| **3** | MCA903 | Elective III | **3** | **0** | **0** | **3** |
| **4** | MCA904 | Elective IV | **3** | **0** | **0** | **3** |
| **5** | MCA905 | Cloud Computing Solutions | **3** | **0** | **0** | **3** |
| **6** | MCA906 | Business organization Basics | **3** | **0** | **0** | **3** |
| **7** | **Practical** | MCA915 | Cloud Computing Solutions - Lab | **0** | **0** | **3** | **2** |
| **8** | MCA921 | Mini Project | **0** | **0** | **6** | **4** |
| **Total Contact Hours and Credits** | | | | **18** | **0** | **9** | **24** |
| **Cumulative contact Hours and credits** | | | | **160** | **2** | **58** | **201** |

**Elective – III**

1. Exchange Server
2. Principle of RIMS

**Elective – IV**

1. ISO27001, PCIDSS and HIPAA
2. Data Centre Architecture

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **YEAR-V SEMESTER-X** | | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credits** |
| **L** | **T** | **P** |
| **1** | **Project** |  | Major Project / Internship | **0** | **0** | **21** | **14** |
|  | | | | |
| **Total Contact Hours and Credits** | | | | **0** | **0** | **21** | **14** |
| **Cumulative Contact Hours and Credits** | | | | **160** | **2** | **79** | **215** |

**Total Credits: 215**

**Course: Introduction to Web Technology**

**Objectives**:

The main objective of this course is to introduce students to the concepts, design principles, theories and technologies used in web site design. Topics include creating web pages, FTP, HTML, CSS, XML and other related topics. Provide the students with the necessary knowledge and skills in using the various technologies and tools for developing web sites. After completing this course the student can demonstrate the knowledge and ability to apply the design principles, techniques and technologies to the development of creative websites

**Module 1: Introduction to Internet**

Introduction, History of internet, Internet Design Principles, Internet Protocols - FTP, TCP/IP, SMTP, Telnet, etc., Client Server Communication, Web System architecture

**Module 2: Introduction to World Wide Web**

Evolution of Web, Static and Dynamic Web Sites, Web Applications, Web Development Technologies - HTML, CSS, JS, XML; Protocols - HTTP, secure HTTP, etc; URL, Web Browser, Web Server, Web Services

**Module 3: HTML**

Introduction to Html, Html Document structure, Html Editors, Html element/tag & attributes, Designing simple page - Html tag, Head tag, Body tag; More Html tags - Anchor tag, Image tag, Table tag, List tag, Frame tag, Div tag ; Html forms - Input type, Text area, Select , Button, Images

**Module 4: CSS**

Introduction to CSS, Syntax, Selectors ,Embedding CSS to Html, Formatting fonts, Text & background colour, Inline styles, External and Internal Style Sheets, Borders & boxing

**Module 5: XML**

Introduction to XML, Difference b/w Html & XML, XML editors, XML Elements & Attributes XML DTD, XML Schema, XML Parser, Document Object Model (DOM), XML DOM.

**Reference Books:**

1. Web Technologies - HTML, JavaScript, PHP, Java, JSP, ASP.NET, XML and Ajax, Black Book, by Dreamtech Press
2. HTML, XHTML & CSS Bible, Brian Pfaffenberger, Steven M.Schafer, Charles White, Bill Karow- Wiley Publishing Inc, 2010
3. HTML Black Book by Steven Holzner
4. Web Design with HTML, CSS, JavaScript and jQuery Set by Jon Duckett

**Course: Fundamentals of Mathematics**

**Objectives:** To teach students, foundation concepts in Mathematics like Matrices, Set, relations and functions and about Differential Integration and Differentiation and with this background, thus enabling students to perform well in their programming and analytical subjects too.

**Module 1: Matrices**

Types of Matrices, Operations of addition, Scalar Multiplication and Multiplication of Matrices, Determinant of a Square Matrix, Minors and Cofactors, Transpose, adjoint and inverse of a matrix, solving system of linear equations, in two or three variables using inverse of a matrix

**Module 2: Sets, relations and functions**

Definition of Set, Type of Sets, Operations on Sets, Venn diagram, Cartesian Product, Relations, Functions, Types of function, Some elementary functions with their graphs (Exponential, logarithmic, modulus), Limit & continuity of a function (Simple Problems)

**Module 3: Differentiation**

Derivative and its meaning, Differentiation of algebraic, trigonometric, exponential & logarithmic functions, Rules of Differentiation, Differentiation by Substitution, Higher Order Differentiation, Maxima and Minima of Simple Functions

**Module 4: Integration**

Integral as Anti-derivative process, Indefinite Integrals, Rules of Integration, Integration by substitution, Definite Integration, Properties of Definite Integral, Finding areas of Simple Closed Curves

**Module 5: Coordinate Geometry**

2D Cartesian Co-ordinate system, Straight line: (Equation & Slope of a line), Circle: Equation of Circle, Equation to Tangent, Conic Sections: Focus, Eccentricity, Directrix, Axis of a conic section, Parabola & Ellipse: (Definitions, equations and shape of curve only)

**References:**

1. Mathematics for BCA by G. C. Sharma &Madhu Jain, Oscar Publication
2. Mathematics Vol-2 by R. D. Sharma, Dhalpat Raj & Sons
3. The Elements of Co-ordinate Geometry Part-I by S. L. Loney, Book Palace, New Delhi

**Course: Computer Fundamentals and Organization**

**Objectives:** The basic knowledge of how a computer works is very important for any fresh networking or operating system professional. The functional knowledge of a computers working and its main building parts are paramount. The computers of today may come with variety of features but the basic working principles remain the same. Students will explore the fundamentals of organization of a computer and the principles and building units of a computer (its hardware). Also, they will be introduced to the basics of networking and MS Office.

**Module 1: General Features of a Computer**

General features of a computer, Generation of computers, Personal computer, workstation, mainframe computer and super computers. Computer applications – data processing, information processing, commercial, office automation, industry and engineering, healthcare, education, graphics and multimedia.

**Module 2: Computer Organization**

Computer organization, central processing unit, computer memory – primary memory and secondary memory, Secondary storage devices – Magnetic and optical media, Input and output units, OMR, OCR, MICR, scanner, mouse, modem.

**Module 3: Computer Hardware and Software**

Computer hardware and software, Machine language and high level language, Application software, computer program, operating system, Computer virus, antivirus and computer security, Elements of MS DOS and Windows OS, Computer arithmetic, Binary, octal and hexadecimal number systems, Algorithm and flowcharts, illustrations, elements of a database and its applications, Basic Gates (Demorgans theorems, duality theorem, NOR, NAND, XOR, XNOR gates), Boolean expressions and logic diagrams, Types of Boolean expressions

**Module 4: MS Office**

Word processing and electronic spread sheet, An overview of MSWORD, MSEXCEL and MSPOWERPOINT

**Module 5: Introduction to Networking**

Network of computers, Types of networks, LAN, Intranet and Internet, Internet applications, World Wide Web, E-mail, browsing and searching, search engines, multimedia applications

**Books for Reference:**

1. Alexis Leon and Mathews Leon (1999) : Fundamentals of information Technology, Leon Techworld Pub.
2. Jain, S K (1999) : Information Technology “O” level made simple, BPB Pub
3. Jain V K (2000) “O” Level Personal Computer software, BPB Pub.
4. Rajaraman, V (1999): Fundamentals of Computers, Prentice Hall India
5. Hamacher, Computer Organization McGrawhill
6. Alexis Leon: Computers for everyone. Vikas, UBS
7. Anil Madaan : Illustrated Computer Encyclopedia. Dreamland Pub
8. Sinha. Computer Fundamentals BPB Pub.

**Course: Introduction to Unix and Linux**

**Objectives** The unit provides an overview of the Linux Operating System, geared toward new users. This course also provides the guidelines for the learners to take up vendor certifications

**Module I Introduction**

Introduction to Multi user System, History of UNIX, Features & Benefits, Versions of UNIX, Features of UNIX File System,, Commonly Used Commands like who, pwd, cd, mkdir, rm, rmdir, ls, mv, ln, chmod, cp, grep, sed, awk ,tr, yacc etc. getting Started (Login/Logout).

Vi Editor: Introduction to Text Processing, Command & edit Mode, Invoking vi, deleting & inserting Line, Deleting & Replacing Character, Searching for Strings, Yanking, Running Shell Command Macros, Set Window, Set Auto Indent, Set No.

**Module 2 Exploring Linux flavors**

Introduction to various Linux flavors. , Debian and rpm packages, Vendors providing DEBIAN & RPM distribution & Features. Ubuntu. History, Versions, Installation, Features, Ubuntu one. Fedora: History, Versions, Installation, Features.

**Module 3 GENERAL OVERVIEW OF THE SYSTEM**

System Structure, User Perspective, Operating System Services Assumption about Hardware, The Kernel and Buffer Cache Architecture of UNIX Operating System, System Concepts, Buffer Headers, Structure of the Buffer Pool, Scenarios for Retrieval of the Buffer, Reading and Writing Disk Units, Advantages and Disadvantages of Buffer Cache.

**Module 4 INTERNAL REPRESENTATION OF FILES**

System Calls for the File System, INODES, Structure of Regular File, Directories, Conversions of a Path, name to an INODE, Super Unit, INODE Assignment to a New File, Allocation of Disk Units. Open, Read, Write, File and Record Close, File Creation, Creation of Special Files, Change Directory and Change Root, Change Owner and Change Mode, STAT and FSTAT, PIPES, Mounting and Unmounting Files System, Link, Unlink.

**Module 4 STRUCTURES OF PROCESSES AND PROCESS CONTROL**

Process States and Transitions Layout of System Memory, The Context of a Process, Manipulation of the Process Address Space, Sleep Process Creation/Termination, The User ID of a Process, Changing the Size of a Process. The Shell. Case Study of Various LINUX Versions.

**Text Books:**

1. The Design of Unix Operating System, Maurice J. Bach, Pearson Education, 2010 (Unit I,II)

2. Advance UNIX, a Programmer‘s Guide, S. Prata, BPB Publications, and New Delhi, 2011 (Unit III,IV)

3. Unix Concepts and Applications, Sumitabh Das, 2010 (Unit V)

**Reference Books:**

1. The UNIX Programming Environment, B.W. Kernighan & R. Pike, Prentice Hall of India. 2009

1. Guide to UNIX Using LINUX, Jack Dent Tony Gaddis, Vikas/ Thomson Pub. House Pvt. Ltd. 2010

**Course: Communication Skills-I**

**Objectives**: To impart good communication skills in the students and give them more confidence in both professional and personal life

**Module1 Basic skills-reading and speaking skills**

Reading and interpretation, Intensive reading,. Writing reviews on books and films, Descriptions, Process description, Summarizing, Instructions, Oral presentations. Debate.

**Module 2: Basic skill: technical writing skill**

Letters – formal, informal, Cover Letter and CV, Synonyms and Antonyms, Indefinite Adjectives, Non-verbal communication, Interactive sessions. Role Plays, Critical reading, Listening and Note taking.

**Module 3:  Basic skill: listening and speaking skills**

Active and Passive Voice, Impersonal Passive, Essay Writing, Comprehension Passage, Editing, Correction of errors, Direct and Indirect, Conversations , Dialogue writing, Discourse Markers. Group activities.

**Textbooks:**

1. Department of English, Anna University, Mindscapes, ‘English for Technologists and Engineers’, Orient Longman Pvt. Ltd, Chennai: 2012.
2. Department of Humanities and Social Sciences, Anna University, ‘‘English for Engineers and Technologists’’ Combined Edition (Volumes 1 and 2), Chennai: Orient Longman Pvt. Ltd., 2006.
3. M.Ashraf Rizvi, “Effective Technical Communication”,Tata mcGraw-Hill Publishing Company Limited, New Delhi.2009.

**Reference Books:**

1. Sumant. S, ‘Technical English’, Second Edition, McGraw-Hill Education (India) Pvt. Ltd., 2008.
2. Dr. M. Hariprasad,” Communicative English “Third Edition, Neelkamal Publications, PVT. LTD.,2007.
3. Sangeeta Sharma , Binod Mishra, ‘Communication Skills for Engineers and Scientists, PHI Learning Private Limited., New Delhi, 2009.

**Course: Programming in C**

**Course Objective:**

Even with the introduction of several high level languages and frameworks, the development of procedural codes is important in several commercial app developments. The object oriented platforms and event driven systems use procedural languages for coding integral command content. C is an important procedural language and was developed initially to write the UNIX operating system. UNIX operating system, C compiler and all UNIX application programs are written in C. C is popular because, it is easy to learn, produces efficient programs, can handle low-level activities, and can be compiled on a variety of platforms. This course focuses on all the basic concepts, syntax and constructs of the C language. For students, who are new to programming, this unit can be considered as the starting point before taking up any other programming oriented units. The students will be implementing the concepts explained here to create simple to complex programs.

**Module 1: Overview of Programming:**

**Introduction to computer based problem solving**, Program design and implementation issues- Flowcharts & Algorithms, Top down design & stepwise refinement, **Programming environment** – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters

**Module 2: Fundamentals of C programming:**

**Overview of C**, Data Types, Constants & Variables, Operators & Expressions, **Control constructs**-if then, for, while, **Arrays**- single & multidimensional arrays, **Functions**-fundamentals – general form, function arguments, return value, **Basic I/O**-formatted and Unformatted I/O, **Advanced features**- Type modifiers and storage class specifiers for data types, Bit operators, ? operator, &operator, \* operator, Type casting, type conversion.

**Module 3: Advanced programming techniques:**

**Control constructs**- Do while, Switch statement, break and continue, exit() function, go to and label, **Scope rules**- Local & global variables, scope rules of functions, **Functions**-parameter passing, call by value and call by reference, calling functions with arrays, argc and argv, recursion- basic concepts, ex-towers of Hanoi

**Module 4: Dynamic data structures in C:**

**Pointers**- The & and \* operator, pointer expression, assignments, arithmetic, comparison, malloc vs calloc, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning pointers, **Structures**- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, **Unions** – Declaration, uses, enumerated data-types, typedef

**Module 5: Additional features:**

**File Handling** – The file pointer, file accessing functions, fopen, fclose, puc, getc, fprintf, **C Preprocessor-** #define, #include, #undef, Conditional compilation directives, **C standard library and header files**: Header files, string functions, mathematical functions, Date and Time functions

**Books for Reference**

1. Let us C by Yashwant Kanetka, 6th Edition, PBP Publication
2. The C programming Language by Richie and Kenninghan, 2004, BPB Publication
3. Programming in ANSI C by Balaguruswamy, 3rd Edition, 2005, Tata McGraw Hill

**Course: Programming in C Laboratory**

**List of Programs**

**Part A**

1. Printing the reverse of an integer.
2. Printing the odd and even series of N numbers.
3. Get a string and convert the lowercase to uppercase and vice--versa using getchar() and putchar().
4. Input a string and find the number of each of the vowels appear in the string.
5. Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end.
6. Printing the reverse of a string.

**Part B**

1. Searching an element in an array using pointers.
2. Checking whether the given matrix is an identity matrix or not.
3. Finding the first N terms of Fibonacci series.
4. Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable.
5. Define a structure with three members and display the same.
6. Declare a union with three members of type integer, char, string and illustrate the use of union.
7. Recursive program to find the factorial of an integer.
8. Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers.
9. Arranging N numbers in ascending and in descending order using bubble sort.
10. Addition and subtraction of two matrices.
11. Multiplication of two matrices.
12. Converting a hexadecimal number into its binary equivalent.
13. Check whether the given string is a palindrome or not.
14. Demonstration of bitwise operations.
15. Applying binary search to a set of N numbers by using a function.
16. Create a sequential file with three fields: empno, empname, empbasic. Print all the details in a neat format by adding 500 to their basic salary.

**Course: Introduction to Unix and Linux Laboratory**

**Objectives**: Students will put their theory knowledge into practice and work on the programs given to them in Laboratory classes. This will not only reinforce their knowledge but provide them with real insight into topics, understand the application of these topics in practical world and expose them to practical difficulties that they may face in real scenario and also present them with methods to tackle these issues.

**List of Programs:**

1. Make a report and a presentation on evolution and development of different versions of Unix
2. Report and execute 25 basic commands of unix.
3. Write a few commands available in /bin and /sbin directory
4. Find the guest directory, Write the permissions of guest directory
5. Create a new Directory test in guest directory
6. Write the permissions of test directory
7. Change the permissions of guest directory to 775
8. Change the permissions of /tmp directory to 700
9. Change the permissions of guest directory to 700
10. Report the functionality and modes of VI Editor.
11. Make and alter files using all 3 methods cat touch and vi editor apply all file operations and document it.
12. Install on vm-ware Ubuntu and fedora and document the process (GUI & CLI)

**SEMESTER 2**

**Course: Communication Skills - II**

**Objectives**: To impart good communication skills in the students and give them more confidence in both professional and personal life

**Module1: Technical vocabulary**

Technical Vocabulary, Punctuation, Numerical Expressions, Expanding Acronyms and Abbreviations, Concord, ‘If’ clauses, Infinitives. Homonyms, Homographs and Homophones, Telephone conversations, Reading Comprehensions, Making of an advertisement

**Module 2:   Technical writing and communication**

Reports – Types, structure, data collection, content, form, Definitions, extended definition, Recommendations, Memos, Checklists. Group Discussions, Listening and comprehending the conversations.

**Textbooks:**

1. Department of English, Anna University, Mindscapes, ‘English for Technologists and Engineers’, Orient Longman Pvt. Ltd, Chennai: 2012.
2. Department of Humanities and Social Sciences, Anna University, ‘‘English for Engineers and Technologists’’ Combined Edition (Volumes 1 and 2), Chennai: Orient Longman Pvt. Ltd., 2006.
3. M.Ashraf Rizvi, “Effective Technical Communication”,Tata mcGraw-Hill Publishing Company Limited, New Delhi.2009.

**Reference Books:**

1. Sumant. S, ‘Technical English’, Second Edition, McGraw-Hill Education (India) Pvt. Ltd., 2008.
2. Dr. M. Hariprasad,” Communicative English “Third Edition, Neelkamal Publications, PVT. LTD.,2007.
3. Sangeeta Sharma , Binod Mishra, ‘Communication Skills for Engineers and Scientists, PHI Learning Private Limited., New Delhi, 2009.

**Course: Operating Systems**

**Objectives:** The operating system is the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers. This course covers the concept of operating system and its applications.

**Module 1 – Introduction to Operating System**

Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines.

**Module 2 – Process Management**

**Processes**: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter process communication, Communication in client-server systems. **Threads:** Introduction to Threads, Single and Multi-threaded processes and its benefits, User and Kernel threads, Multithreading models, Threading issues. **CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling, Algorithm Evaluation, Process Scheduling Models. **Process Synchronization:** Mutual Exclusion, Critical – section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions **Deadlocks:** System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

**Module 3: Storage Management**

**Memory Management**: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging. **Virtual Management**: Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames, Thrashing, Operating System Examples, Page size and other considerations, Demand segmentation **File-System Interface**: File concept, Access Methods, Directory structure, File- system Mounting, File sharing, Protection and consistency semantics **File-System Implementation**: File-System structure, File-System Implementations, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery **Disk Managemen**t: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Attachment, stable-storage Implementation

**Module 4: Protection and Security**

**Protection**: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Acess Matrix, Revocation of Access Rights, Capability- Based Systems, Language – Based Protection. **Security:** Security Problem, User Authentication, One – Time Password, Program Threats, System Threats, Cryptography, Computer – Security Classifications.

**Books for Reference**

1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.
2. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
3. Silberschatz / Galvin / Gagne, Operating System,6th Edition,WSE (WILEY Publication)
4. William Stallings, Operating System, 4th Edition, Pearson Education.
5. H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education
6. Abraham Silberschatz and peter Baer Galvin, Operating System Concepts, 8th Edition, Pearson Education 1989 (Chapter 1,3.1,3.2,3.3,3.4,3.6,4,5,6 (Except 6.8,6.9), 7, 8,9,10,11,13, (Except 13.6) 19 (Except 19.6),20(Except 20.8, 20.9), 22,23)
7. Nutt: Operating Systems, 3/e Pearson Education 2004

**Course: OOPS with C++**

**Objectives:** The main objective is to learn the basic concept and techniques which form the object oriented programming paradigm. Object-oriented programming is a new way of thinking about problem using models organizes around real world concept. The Fundamental construct is the object which combines both data-structure and behaviour in a single entity which is in contrast to conventional programming in which data-structure and behaviour are loosely connected.

**Module 1: Introduction**

Evolution of programming methodologies-Procedure oriented versus Object Oriented Programming-characteristics of OOP, Basics of OOP, Merits and Demerits of OOP. **Data Types:** Different data types, operators and expressions in C++, Keywords in C++. **Input and Output:** Comparison of stido.h and iostream.h, cin and cout. **Decision and loop:** Conditional statement - if-else statement, nested if-else statement, switch, break, continue, and goto statements, Looping statements- for loop, while loop, Do-while loop. **Arrays, String and Structures :** fundamentals-Single dimensional, multi-dimensional arrays, fundamentals of strings, different methods to accept strings, different string manipulations, array of strings, Basics of structures-declaring and defining structure- Accessing structure members, array of structures, Unions difference between structures and Unions, Enumerated data types-declaration and their usage.

**Module 2:**

**Class:** Definition-defining the class, defining data members and member functions, Access specifier-private, public, protected, objects as function arguments, returning objects from the function, scope resolution operator, member function defined outside the class, difference between class and structure, array as class member data, Array of objects. **Functions in C++ :** Function definition, function declaration, Built-in functions, user defined functions, calling the function, passing parameter-actual and formal, different methods of calling the function call by value, call by reference using reference as parameter and pointer as parameter, overload function-different types of arguments-different number of arguments, inline function, default argument, storage classes-automatic, external, static, register. **Constructor and Destructor:** Constructors-constructor with argument, constructor without arguments, constructor with default arguments, Dynamic constructor, constructor overloading, copy constructor, destructors, Manipulating private data members.

**Module 3:**

**Operator overloading:** Defining operator overloading, overloading unary operator, overloading binary operator, manipulation of string using overloaded operator, rules for overloading operator. Data conversion: conversion between Basic types, conversion between objects & Basic types, conversion between objects of different classes. **Inheritance:** Base Class & derived class, defining derived classes, protected access specifier, public inheritance and private inheritance-member accessibility, constructors and destructors in derived classes, Level of inheritance-single inheritance, multiple inheritance, multi-level inheritance, hierarchical inheritance, hybrid inheritance.

**Module 4:**

**Pointer:** Pointer declaration and Access, Pointer to void, pointer and arrays, pointer constant and pointer variable, pointer and functions, pointer, call by pointer arrays, array of pointers to string, printer sort, memory management-new and delete, pointer to object-referencing members using pointers, self containing class, this pointer, returning values using this pointer.  **Virtual function:** Normal member functions accessed with pointers, virtual member function access, late binding, pure virtual function, abstract class, virtual base class. **Friend functions and static function:** Purpose, defining friend functions, friend classes, static function, accessing static function numbering positive objects.

**Module 5:**

**Templates and Exception Handling:** Introduction to templates, class templates, function templates, Member function templates, Template arguments, Exception handling. **Console IO Operator :** C++ stream and C++ stream classes, unformatted I/O operators, formatted I/O operators-manipulators-user defined manipulators. **Files :** Class for file stream operators, opening and closing a file, file nodes, writing an object to disk, reading an object from disk, binary versus character files, I/O with multiple object, stream class, file pointer-specifying the position, specifying the object, tellg() function, seekg() function. Command line arguments.

**Books for References:**

1. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill. Publications
2. Strousstrup: The C++ Programming Language, Pearson Edition, 3rd Edition
3. Lafore Robert: Object Oriented Programming in Turbo C++, Galgotia Publications
4. Lippman: C++ Primer, 3/e Pearson Education
5. C++ completer reference by Herbert Schildt, Tata McGraw Hill Publications.
6. Let us C++ by Yeshwanth Kanetkar

**Course: System Configuration and Maintenance**

**Objectives:**This course provides the students with an overall view of the hardware and peripheral devices. It explains the characteristics, functions and working of these hardware components. Basics of how to configure and maintain a system is explained here with hands-on exposure.

**Module 1: Hardware**

Identify basic computer hardware, Mother boards Form factor, Processor speed/cores: Single/Dual/Quad core, Intel based / Cell based/AMD based, GHz vs. MHz, Processor cache size, Common Processor Sockets, Bus speed (as they relate to motherboards, memory, etc), RAM: DDR, DDR2, DDR3, DIMMS vs. SODIMMS, Hard drives: RPMs, Cache size, Flash based vs. traditional hard drives, SATA, SCSI, IDE, Internal vs. external, Identify different computing devices: Desktop, Server, Portable: Laptop, PDA, Smartphone, Netbook. Local vs. network shares.

**Module 2: Peripheral Devices**

Explain the characteristics and functions of core input devices: Keyboard, Mouse, Tablet (touch screen), Numeric keypad, Gamepad. Identify the proper use of the following devices: Monitors: Adjust monitor settings (brightness, contrast, etc), Types of monitors. Explain the characteristics and functions of internal and external storage devices: CD/CD-RW Drive, DVD/DVD-RW Drive, Blu-Ray Disk Drive, USB storage (solid state vs. magnetic disk), Multi-card reader and writer, Hard drives, Mobile media devices (e.g. MP3 player or PDAs). Explain the characteristics and functions of peripheral devices: Digital camera, Web camera, Speaker, Tuner, Microphone, Printer / scanner; Computer Cases and Cabinets (desktop, tower, laptop, custom cases)

**Module 3: Connectors and Ports**

Identify differences between connector types: DVI, VGA, HDMI, USB, PS/2, FireWire, Bluetooth and Wireless, Serial. Network connectors, PCMCIA, Express Card, 3.5mm audio jack, Power connectors. Keyboard (keyboard layout: regionalization). Mouse (touchpad, optical, trackball). Printer (USB, wireless, networked)

**Module 4: System Configuration and Maintenance**

System configuration: configure Basic Input Output System (BIOS) eg date/time, power management, Voltage and power requirements, Protecting BIOS. Software maintenance: upgrade software e.g. virus definition files, patches/updates, scheduling maintenance tasks, utility software e.g. defragmentation, clean-up, back-up, system profilers, other third party utility software e.g. compression utilities, spyware/malware removal, security, install latest antivirus/security updates, update user profiles, configure desktop, icon size, font size, color, background, customize menu, file management, files and folders, setting file/folder sharing permissions, peripheral devices, printer, scanner, camera, communication devices. Hardware maintenance: upgrade hardware, install and configure new peripherals eg printers, scanners, install and configure additional or replacement devices eg hard drive, memory, graphics, sound, optical media, network, cleaning equipment.

**Module 5: Operating Systems: Features and Requirements**

Microsoft Windows Operating Systems: From Windows XP to Windows 8, Features: 32-Bit Vs. 64-Bit, Aero, Gadgets, User Account Control, Bit-Locker, System Restore, Administrative Tools, Firewall, Security Center, File Structure And Paths, Compatibility Tools and Windows Upgrade OS Advisor, Boot Methods: (USB, CD-ROM, DVD, PXE),Type of Installations: Creating Image: Unattended Installation, Upgrade from Windows 7 to windows 8 Clean Install, Repair Installation, Multiboot, Remote Network Installation and Image Deployment. Partitioning: Dynamic, Basic, Primary, Extended and Logical, File System Types Formatting: FAT, FAT32, NTFS and CDFS, File management: manage files/folders permissions, NTFS security configuration. back-up procedures, Usage of Appropriate Operating System Features and Tools: Administrative, Computer management, General, Disk Management and Command Line Utilities Tools, Control Panel Utilities: Common for all Windows OS, Unique to Windows Vista and Unique to Windows 7 and Unique to Windows 8. Performing Preventive Maintenance Procedures Using Appropriate Tools: Best Practices, Security Settings: User and Groups, Administrator, Power User, Guest and Standard User, Basics of Client-Side Virtualization: Purpose of Virtual Machines, Resource Requirements, Emulator Requirements, Security Requirements and Network Requirements. Non-Windows Operating System: Unix-based operating system, Mac operating system, type of file systems, Disk Management and Command Line Utilities Tools, portioning, user accounts creation and configuration, file permissions and privileges.

**Reference Books:**

1. PC Hardware in a Nutshell by Barbara Fritchman Thompson, Robert Bruce Thompson- O’Reilly. 2nd Edition , 2010
2. Fundamentals of Computer Organization and Architecture by By Mostafa AB-EL-BARR and Hesham EL-REWNI, John Wiley and Sons, 2006 Edition
3. Fundamental Of computer Organization by Albert Zomaya, 2010 Edition

**Course: Security Threats and trends**

**Objectives:** Security threats and trends are very important in Information technology. Each year, the Information Security Forum, a non-profit association that researches and analyses security and risk management issues, releases its 'Threat horizon' report to provide a forward-looking view of the biggest security threats over a two-year period.

**Module 1: Viruses & Worms**

Introduction to Viruses &Worms**,** the concept of how Viruses & Worms work, the various types of Viruses &Worms, the infection vectors of Viruses &Worms, managerial, technical & procedural controls to address Viruses & Worms

**Module 2: Malware & Botnets**

Introduction to Malware & Botnets, the concept of how Malware, Trojans & Botnets work, the concept of honeynets and honeypots, Managerial, technical& procedural controls to address Malware, Trojans & Botnets

**Module 3: Trojans & Rootkits**

Introduction to Remote Access Trojans & Rootkits, concepts, their working methods , their security implications and the managerial , technical and procedural controls to address RATs

**Module 4: Cyber Warfare**

Introduction to Advanced Persistent Threats &Information Warfare, concepts, their working methods, their security implications and the managerial, technical and procedural controls to address these threats

**Module 4: V Social Engineering**

Introduction, Human and Computer based Social Engineering, examples of Social Engineering Attacks, Counter measures

**Text Books**:

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole
2. The CEH Prep Guide: The Comprehensive Guide to Certified Ethical Hacking, by Ronald L. Krutz (Author), Russell Dean Vines,Wiley Publications

**Course: Data Structures using C**

**Objectives:** Objectives: A data structure is a particular way of storing and organizing data in a computer so that it can be used efficiently. Different kinds of data structures are suited to different kinds of applications and some are highly specialized to specific tasks. This course covers the basic concepts of different data structures which are the basic building blocks of Programming and problem solving.

**Module 1: Introduction to Data structures**

Definition, Classification of data structures: primitive and non primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing. Dynamic memory allocation and pointers: Definition of dynamic memory allocation, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation functions: malloc(), calloc(), free() and realloc(). Recursion: Definition, Recursion in C (advantages), Writing Recursive programs – Binomial coefficient, Fibonacci, GCD.

**Module 2: Searching and Sorting**

Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search. Sort: General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort

**Module 3: Stack and Queue**

Stack – Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix, Applications of stacks. Queue: Definition, Array representation of queue, Types of queue: Simple queue, Circular queue, Double ended queue (deque) , Priority queue , Operations on all types of Queues

**Module 4: Linked List**

Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list, Operations on singly linked list: creation, insertion, deletion, search and display.

**Module 5: Tree Graphs and their Applications:**

Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree: Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and postorder. Graphs, Application of Graphs, Depth First search, Breadth First search.

**Books for References:**

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
2. Lipschutz: Schaum’s outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using ‘C’
4. Trembley and Sorenson Data Structures
5. E. Balaguruswamy Programming in ANSI C.
6. Bandyopadhyay, Data Structures Using C Pearson Education, 1999
7. Tenenbaum, Data Structures Using C. Pearson Education, 200
8. Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
9. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006
10. Langsam, Ausenstein Maoshe & M. Tanenbaum Aaron Data Structures using C and C++ Pearson Education

**Course: OOPS with C++ Lab**

**Part A**

1. Number of vowels and number of characters in a string.
2. Write a function called zeros maller () that is passed with two introduce arguments by reference and set the smaller of the number to zero. Write a man() program to access this function.
3. Demonstration of array of object.
4. Using this pointer to return a value ( return by reference).
5. Pointer sort.
6. Demonstration of virtual function.
7. Demonstration of static function.
8. Accessing a particular record in a student's file.

**Part B**

1. Using different methods to write programs to implement function overloading with default arguments for the following problems :
2. To find whether a given number is prime.
3. To find the factorial of a number
4. Write a program to create a database for a bank account contains Name, Account no, Account type, Balance, Including the following a) Constructors b) destructors call) default constructors d) input and output function ; input and output for 10 people using different methods.
5. Create a class to hold information of a husband and another for the wife. Using friend functions give the total salary of the family.
6. Write a program to overload the following operators (any 3)
7. Binary operator '+' to concatenate 2 strings
8. Relational operator '<' to find whether one data is less than the other
9. Unary operator '++' to find the next date of a given date.
10. Create a base class for a stack and implement push and pop operation. Include a derived class to check for stack criteria such as a) stack empty b)stack full c) stack overflow d) stack underflow.
11. Create a database using concepts of files for a student including the following fields: Student- name, Student's Reg No, Student's Attendance (overall % of attendance); and enter data for 10 students and output the same in proper format.
12. Using operator overloading concept implement arithmetic manipulation on two complex numbers.

**Course: Data Structures using C Lab**

**List of Programs**

**Part A**

1. Use a recursive function to find GCD of two numbers.
2. Use a recursive function to find the Fibonacci series.
3. Use pointers to find the length of a string and to concatenate two strings.
4. Use pointers to copy a string and to extract a substring from a given a string.
5. Use a recursive function for the towers of Hanoi with three discs.
6. Insert an integer into a given position in an array.
7. Deleting an integer from an array.
8. Write a program to create a linked list and to display it.
9. Write a program to sort N numbers using insertion sort.
10. Write a program to sort N numbers using selection sort.

**Part B**

1. Inserting a node into a singly linked list.
2. Deleting a node from a singly linked list.
3. Pointer implementation of stacks.
4. Pointer implementation of queues.
5. Creating a binary search tree and traversing it using in order, preorder and post order.

6. Sort N numbers using merge sort.

**SEMESTER 3**

**Course: Storage Management**

**Objectives:**Data is all around us, in different forms and amounts. As we are steeping into revolutionizing world of advanced computing like cloud computing, data storage has also undergone many transformations in terms of techniques and hardware used for the same. This makes it significant for a computer student to learn different aspects of data storage. In this course, students will learn fundamentals of data storage, covering topics like demands on data, how storage techniques have evolved over a period of time and vital information about storage topologies like DAS, NAS and SAN, along with their comparison features. The second unit deals with different hardware required for storage like adapters, connectors, cables and their individual features. Different storage protocols used like ATA, SATA, SPI and its sub-categories will be taught to students in the following units. Topics storage security and storage infrastructure are addressed in the final unit.

**Module 1 : Introduction to Information storage and Management**Information Storage: Data – Types of Data –Information - Storage , Evolution of Storage Technology and Architecture, Data Center Infrastructure - Core elements- Key Requirements for Data Center Elements -Managing Storage Infrastructure, Key Challenges in Managing Information, Information Lifecycle - Information Lifecycle Management - ILM Implementation -ILM Benefits ,Summary

**Module 2: Storage System Environment**

Components of a Storage System Environment – Host –Connectivity – Storage, Disk Drive Components –Platter – Spindle - Read/Write Head - Actuator Arm Assembly - Controller - Physical Disk Structure - Zoned Bit Recording - Logical Block Addressing , Disk Drive Performance -1 Disk Service Time , Fundamental Laws Governing Disk Performance , Logical Components of the Host - Operating System - Device Driver -Volume Manager - File System – Application , Application Requirements and Disk Performance, Summary

**Module 3: Backup and Recovery**Backup Purpose -Disaster Recovery - Operational Backup –Archival, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods , Backup Process, Backup and Restore Operations, Backup Topologies - Serverless Backup , Backup Technologies -Backup to Tape - Physical Tape Library - Backup to Disk - Virtual Tape Library

**Module 4 : Local Replication**Source and Target -Uses of Local Replicas, Data Consistency - Consistency of a Replicated File System - Consistency of a Replicated Database , Local Replication Technologies - Host-Based Local Replication - Storage Array-Based Replication , Res tore and Restart Considerations - Tracking Changes to Source and Target , Creating Multiple Replicas, Management Interface

**Module 5: Managing the storage Infrastructure**Monitoring *the* Storage Infrastructure -Parameters Monitored - Components Monitored - Monitoring Examples - Alerts, Storage Management Activities - Availability management - Capacity management - Performance management - Security Management - Reporting- Storage Management Examples, Storage Infrastructure Management Challenges

**Text Book:**

1. Storage Networks: T.he Complete Reference, Robert Spalding, Tata McGraw Hill Publication, 2003

**Reference Book:**

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley; 1 edition (April 6, 2009)

**Course: Information Security -I**

**Objectives:** The course primarily covers the Types of Threats, Vulnerabilities, Risks and various terminologies in Information Security. It explains the formation of Security policy at various levels inside the Organization and provides the definition Procedures, Standard and Guidelines. The units emphasizes the need of Performing Asset Classification and Declassification, Retention and Disposal of Information Asset also it identifies the various levels of Authorization for access Viz., Owner, Custodian and User. The course covers the different types of Access Controls and Physical security measures to safeguard the Assets and conclusively, it deals with the Digital Rights Management also covering the concepts of Common Authentication protocols and Real world Protocols.

**Module 1: Introduction to Information Security**

Introduction: Security Definition, Why Security, Security and its need, Current Trends and Statistics, Basic Terminology, The C I A of Security the Relation: Security functionality and Ease of Use Triangle.

**Module 2: User Identity and Access Management**

User identity and Access Management: Authentication, Account Authorization, Validation, Access Control and Privilege management. Hashing and Cryptography- Encryption and Decryption

**Module 3: System and Server Security**

System Security, Desktop & Server Security, Firewalls, Password cracking Techniques, Key-logger, viruses and worms, Malwares & Spy wares, Windows Registry

**Module 4: Internet Security**

Internet Security: LAN Security, Email Security, Hacking attacks, preventive measures.

**Module 5 Risk Assessment and Cyber Laws**

Vulnerability Assessment, Penetration Testing**,** Cyber Laws

**Text Book:**

1. Information Systems Security: Security Management, Metrics, Frameworks And Best Practices - Nina Godbole, ISC2 Press, 2010

**Reference Book:**

1. Information Security Management Handbook, Volume 4 - Micki Krause, ISC2 Press, 2007

**Course: Relational Database Management Systems**

**Objectives:** A database management system (DBMS) is collection of software meant to manage a Database. Many popular databases currently in use are based on the relational database model. RDBMSs have become a predominant choice for the storage of information in new databases used for financial records, manufacturing and logistical information, personnel data and much more. The course covers the basic concepts of databases in general with an emphasis on relational databases, modeling techniques and writing queries. Normalization techniques, Transaction processing, Concurrency Control techniques and Recovery of databases against crashes are also covered.

**Module 1: Introduction**

Purpose of Database System -– Views of data – Data Models – Database Languages –– Database System Architecture – Database users and Administrator – Entity– Relationship model (E-R model ) – E-R Diagrams -- Introduction to relational databases

**Module 2: Relational Model**

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals, Oracle data types, Data Constraints, Column level & table Level Constraints, working with Tables, Defining different constraints on the table, Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator, Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL. Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins), Sub queries Union, intersect & Minus Clause, Creating view, Renaming the Column of a view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes, Creating and managing User, Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases

**Module 3: Database Design**

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

**Module 4: Transactions**

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Intent Locking – Deadlock- Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.

**Text Books:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006
2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addision Wesley, 2007.
3. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2003.

**Course: Programming in JAVA**

**Objectives:** Object oriented programming is the most proven technique for developing reliable programs. It helps in increased productivity, reusability of code, decrease in the development time, and reduces cost of production to an extent. The cost of maintaining such systems have also considerably decreased. There are many languages which used the object oriented concepts and techniques. Some of them are C++, Java, Smalltalk, Objective-C, etc. Java is a purely object oriented language. Systems/applications created using java programming language reduces the need for developing and maintain complex and space consuming applications. Java has a lot of advantages of being simple, robust, platform independent, etc. Nowadays java is also found in the mobile phones. This unit focuses on the concepts of object oriented programming language and the different constructs for creating applications in java. This course provides students with an understanding of the object oriented concepts which helps in the field of programming, management of data, etc. and of Java programming which helps to explore the object oriented nature of the language and the multi-platform versatility offered by it.

**Module 1: Introduction**

History, Overview of Java, Object Oriented Programming, A simple Program, Two control statements - if statement, for loop, using Blocks of codes, Lexical issues - White space, identifiers, Literals, comments, separators, Java Key words. Data types: Integers, Floating point, characters, Boolean, A closer look at Literals, Variables, Type conversion and casting, Automatic type promotion in Expressions Arrays. **Operators:** Arithmetic operators, The Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator, Operator Precedence. Control Statements: Selection Statements - if, Switch: Iteration Statements - While, Do-while, for Nested loops, Jump statements.

**Module 2: Classes:**

Class Fundamentals, Declaring objects, Assigning object reference variables, Methods, constructors, “this” keyword, finalize ( ) method A stack class, Over loading methods, using objects as parameters, Argument passing, Returning objects, Recursion, Access control, Introducing final, understanding static, Introducing Nested and Inner classes, Using command line arguments. Inheritance: Inheritance basics, Using super, method overriding, Dynamic method Dispatch, using abstract classes, using final with Inheritance.

**Module 3: Packages**

Definition, Access protection importing packages, Interfaces: Definition implementing interfaces. Exception Handling: Fundamental, Exception types, Using try and catch, Multiple catch clauses, Nested try Statements, throw, throws, finally, Java’s Built - in exception, using Exceptions.

**Module 4: Multithreaded Programming**

The Java thread model, The main thread, Creating a thread, Creating multiple thread, Creating a thread, Creating multiple threads, Using isalive() and Join(), Thread - Priorities, Synchronization, Inter thread communication, suspending, resuming and stopping threads, using multi threading. 1/0 basics, Reading control input, writing control output, Reading and Writing files, Applet Fundamentals, the AWT package,AWT Event handling concepts The transient and volatile modifiers, using instance of using assert.

**Module 5: JAVA Database Connectivity (JDBC)**

Database connectivity: JDBC architecture, JDBC Drivers, the JDBC API: loading a driver, connecting to a database, Creating and executing JDBC statements, Handling SQL exceptions, Accessing result sets: Types of result sets, Methods of result set interface. An example JDBC application to query a database

**Books for Reference:**

1. The complete reference Java –2: V Edition By Herbert Schildt Pub. TMH.
2. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

**Course: Computer Networks**

**Objectives:** The focus of this unit is providing a background to the basics of networking and its underlying principles. The learners taking this unit will explore the fundamentals of networking, the principle and purpose behind layered models, devices used in networks and their wireless connectivity and the ways to troubleshoot network related issues. The unit underpins the principles of networking and enables the learners to work towards taking up vendor certifications in the networking domain. This course enables learners to understand computer networking concepts, how they work, how they operate and the protocols, standards and the models associated with networking technology and their troubleshooting mechanisms.

**Module 1: Evolution of Computer Networks**

Types of Networks: Broadcast and Point-to-point, LAN, MAN, WAN, Wireless networks. Protocols & Standardization,  ISO/OSI Reference model, TCP/IP Reference Model .Application Layer, Application layer protocols:-WWW and HTTP, FTP, DNS, SMTP, SNMP, RPC, P2P File sharing, Domain Name system (DNS)

**Module 2: Transport layer and Network Layer**

Transport Layer Services, Relationship with Network Layer, Relationship with Application Layer, Multiplexing and De multiplexing, UDP, TCP: Header ,Segment Structure, Services, Connection establishment and termination, Flow control and window size advertising, TCP time out and re-transmission,  Congestion Control, TCP Fairness, Delay  Modeling.

Network layer Services, Datagram and Virtual circuit services, IP datagram format and Types of Services, Datagram encapsulation and Fragmentation, Reassembly and fragmentation

**Module 3: Routing and Datalink Layer**

Routing: Link state routing, distant vector routing, hierarchical routing, multicast routing,   Data link layer services: Error detect and correction techniques, Elementary Data link layer protocols, sliding window protocols, HDLC ,Multiple access protocols, TDM, FDM, CDMA Random access protocols: ALOHA, CSMA,CSMA/CD,CSMA/CA. Circuit and Packet Switching, Virtual Circuits, Switching Technology for LAN, Ethernet switches, Virtual LAN

**Module 4: Physical Layer, High speed Networks and Network programming**

Physical Layer services, Transmission media, Data encoding schemes. ISDN, BISDN, Frame relay, Fast Ethernet and Gigabit Ethernet, FDDI, SONET .NETBIOS programming, TCT/IP and Socket programming. Network Performance: Analytical Approaches-Network Traffic Monitoring-simulations

**Text Book:**

1. Youlu Zheng and Shakil Akhtar, Networks for Computer Scientist and Engineers, Oxford University Press,2006
2. James F. Kurose and Keith W. Ross, Computer Networking – A Top-Down Approach Featuring the Internet,2/e Pearson Education ,2003

**Reference Books:**

1. S. Keshav, An Engineering Approach to Computer Networking, Pearson education ,2002
2. Halsall, Data Communication, Computer Networks and Open Systems, Addison Wesley, 1996
3. Andrew S. Tanenbaum, Computer Networks , 4/e, Pearson education, 2003
4. Behrouz A. Fourouzan ,Data Communications and Networking, 2/e Tat McGrawhill,2000
5. Leon-Garcia and I. Widjaja, Communication Networks, Tata McGraw Hill, 2000
6. Bertsekas and Gallagar , Data Networks, 2/e, PHI, 1992
7. Douglas E Comer ,Computer Networks and Internet’s, 2/e Pearson Education,2004
8. Gallo, Computer Communication and Networking Technologies, Thomson Learning

**Course: Software Engineering**

**Objectives:** Software engineering incorporates various accepted methodologies to design software. This subject gives a detailed description of the entire process of developing a software project and also the issues associated after development. This course covers the introductory concepts of software engineering and its design

**Module 1: Software Product and Process**

Introduction – S/W Engineering Paradigm – Verification – Validation – Life Cycle Models – System Engineering – Computer Based System – Business Process Engineering, Overview – Product Engineering Overview.

**Module 2: Software Requirements**

Functional and Non-Functional – Software Document – Requirement Engineering Process – Feasibility Studies – Software Prototyping – Prototyping in the Software Process – Data – Functional and Behavioral Models – Structured Analysis and Data Dictionary.

**Module 3: Analysis, Design Concepts and Principles**

Systems Engineering - Analysis Concepts - Design Process And Concepts – Modular Design – Design Heuristic – Architectural Design – Data Design – User Interface Design – Real Time Software Design – System Design – Real Time Executives – Data Acquisition System – Monitoring And Control System.

**Module 4: Testing**

Taxonomy of Software Testing – Types Of S/W Test – Black Box Testing – Testing Boundary Conditions – Structural Testing – Test Coverage Criteria Based On Data Flow Mechanisms – Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques

**Module 5: Software Project Management**

Measures And Measurements – ZIPF’s Law – Software Cost Estimation – Function Point Models – COCOMO Model – Delphi Method – Scheduling – Earned Value Analysis – Error Tracking – Software Configuration Management – Program Evolution Dynamics – Software Maintenance – Project Planning – Project Scheduling– Risk Management – CASE Tools

**Text Books:**

1. Ian Sommerville, “Software engineering”, Seventh Edition, Pearson Education Asia, 2007
2. Roger S. Pressman, “Software Engineering – A practitioner’s Approach”, Sixth Edition, McGraw-Hill International Edition, 2005

**Course: Relational Database Management Laboratory**

**List of experiments**

1. Create User in Oracle Database and grant and revoke the privileges and use of commit savepoint roleback command.
2. Create the following:

* Synonym sequences and Index
* Create alter and update views.

1. Create PL/SQL program using cursors, control structure, exception handling
2. Create following:

* Simple Triggers
* Package using procedures and functions.

1. Create the table for

* COMPANY database
* STUDENT database and Insert five records for each attribute.

1. Illustrate the use of SELECT statement
2. Conditional retrieval - WHERE clause
3. Query sorted - ORDER BY clause
4. Perform following:

* UNION, INTERSECTION and MINUS operations on tables.
* UPDATE, ALTER, DELETE, DROP operations on tables

1. Query multiple tables using JOIN operation.
2. Grouping the result of query - GROUP BY clause and HAVING clause
3. Query multiple tables using NATURAL and OUTER JOIN operation.

**Course: Programming in Java Laboratory**

**List of experiments**

**Part A**

1. Write a program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write a program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1t000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing array.
8. Write a program to create object for Tree Set and Stack and use all methods.
9. Write a program to check all math class functions.
10. Write a program to execute any Windows 95 application (Like notepad, calculator etc)
11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

**Part B**

1. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions.
2. Write a program to get file name at runtime and display number f lines and words in that file.
3. Write a program to list files in the current working directory depending upon a given pattern.
4. Create a textfileld that allows only numeric value and in specified length.
5. Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels.

**SEMESTER 4**

**Course: Introduction to Public Speaking**

**Course Objective:**

Educational success as well as career advancement requires the ability to articulate your thoughts clearly, effectively and to have strong communication skills. In this course, the students will learn the principles of public speaking to improve the quality of their speech and present them with more confidence. The objective of this course not only emphasizes on the concept of verbal communication but also on principles of nonverbal communication - through clothes and body language. Topics include types of managerial speeches, building Persuasion & Negotiation abilities. Body Language, Postures, Gestures, Eye contact, Personality styles, Grooming, Dress code Reading Comprehension, Group communication Upon completing this course, the students will be able to design and deliver basic and informative presentations more concisely and clearly, speak confidently with appropriate rate, projection, movement, and vocal variety.

**Module 1: Oral Communication**

Principles of nonverbal communication - through clothes and body language, Types of managerial speeches - speech of introduction, speech of thanks, occasional speech, theme speech, Mastering the art of giving interviews in selection or placement interviews, discipline interviews, appraisal interviews, exit interviews, Building Persuasion & Negotiation abilities.

**Module 2: Body Language & Grooming**

Introduction to Body Language, Postures, Gestures, Eye contact, Personality styles, Grooming, Dress code

**Module 3: Art of Communicating in Groups**

Reading Comprehension, Group communication by way of meetings &group discussions, Business presentation - Features of good presentations - Planning, Structuring and Delivering presentations - Handling questions - Coping with nervousness.

**Reference Books:**

1. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill.
2. Chaturvedi P.D. et al, Business Communication; Concepts, Cases, & Applications, Pearson Education.
3. Shirley Taylor, Communication for Business, Pearson Education.
4. Lesiicar and Flatley, BasicBusiness Communication, Tata McGraw-Hill.
5. Courtan L. Bovee et al., Business Communication Today, Pearson Education.

**Course: Routing**

**Course Objective:** This course introduces the architecture, functions, and components of the Internet and computer networks, the principles and structure of IP addressing and subnetting, the fundamentals of Ethernet, the architecture, components and operations of routers, routing protocols and switches in a network. Topics include TCP/IP, Ethernet, IPv4, routers, switches. As we cover these topics, the students will learn how the internals of the Internet work to support the Web and other networked applications. After completing the course the students will develop a detailed understanding of how to configure, implement and troubleshoot widely-used networking technologies

**Module 1: Networking Fundamentals**

The TCP/IP and OSI Networking Models, Fundamentals of Ethernet LANs, Fundamentals of WANs, Fundamentals of IPv4 Addressing and Routing, Fundamentals of TCP/IP Transport and Applications

**Module 2: Ethernet LANs and Switches**

Building Ethernet LANs with Switches, Cisco LAN Switches, Configuring Ethernet Switching.

**Module 3: IP Version 4 Addressing and Subnetting**

Perspectives on IPv4 Subnetting, Analyzing Classfull IPv4 Networks, Analyzing Subnet Masks, Analyzing Existing Subnets, Implementing IP Version 4: Operating Cisco Routers, Configuring IPv4 Addresses and Routes, Implementing Ethernet Virtual LANs, Troubleshooting Ethernet LANs, Spanning Tree Protocol Concepts, Troubleshooting LAN Switching

**Module 4: LAN Routing**

Configure IPv4 Routing, Configure and Verify Host Connectivity, Advanced IPv4 Addressing Concepts, Describe the boot process of Cisco IOS routers; Operation status of a serial interface; Manage Cisco IOS files; Routing and Routing Protocols; OSPF (multi-area); EIGRP (single AS); Passive Interface

**Module 5: IPv4 Services and IP Version 6**

Basic IPv4 Access Control Lists, Advanced IPv4 ACLs and Device Security, Network Address Translation, Recognize high availability (FHRP); Describe SNMP v2 and v3, IPV6 addressing

**Reference Books:**

1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011

**Text Books:**

1. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013
2. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008
3. CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

**Course: OSI Layer and Network Protocols**

**Course Objective:** OSI model is a conceptual model developed to explain the basic working of communication system through the concept of abstraction layers. Seven layers are defined as standards and multiple protocols operate at each level and carry out specific tasks. A sound knowledge of OSI layer, its protocols and their specific functions is very important for any computer professional to harness the full capabilities of the system and deliver best output.

Different layers of OSI model are explained to the students, along with protocols in each category. The functions of each protocol are taught in subsequent chapters.

**Module 1 Open Systems Interconnection (OSI) Model**

Introduction to the 7 layers of the OSI model, concept of the OSI model, the Application Layer, the Presentation Layer, the Session Layer, the Transport Layer, the Network Layer, the Data Link Layer &the Physical layer

**Module 2 Security Protocols - Application Layer**

Introduction to Protocol concepts, Important Protocols,File Transfer Protocol, Socket Secure (SOCKS), Secure Shell (SSH), Remote Terminal Control Protocol (Telnet), Transport Layer Security/Secure Sockets Layer (TLS/SSL), Extensible Messaging & Presence Protocol (XMPP), Wireless Application Protocol (WAP) & Internet Relay Chat (IRC)

**Module 3: Transport Layer**

Introduction to Transport Layer, TCP/IP, User Datagram Protocol (UDP), Real-time Transport Protocol (RTP), Datagram Congestion Control Protocol (DCCP), Stream Control Transmission Protocol (SCTP), Resource reservation Protocol (RSVP)&Explicit Congestion Notification (ECN)

**Module 4: Network Layer**

Introduction to Network Layer**,** Internet Protocol Version 4 (IP4), Internet Protocol Version 6 (IP6), Internet Protocol Security (IPSEC), Internet Control Message Protocol (ICMP) & Internet Group Management Protocol (IGMP)

**Module 5: Data Link Layer:** Introduction to Data Link Layer, the Address Resolution Protocol (ARP), the Open Shortest Path First (OSPF), the Neighbor Discovery Protocol (NDP),the Tunneling Protocol (Tunnels) &the Point to Point Protocol (PPP)

**Reference/ Text Books**:

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole
2. Network Security Bible by Eric Cole

**Course: Cryptography**

**Course Objectives:** Security is ubiquitous. With the advent of e-commerce and electronic transactions, the need for development of secured systems has grown tremendously. Cryptography is the study of building ciphers to ensure the confidentiality and integrity of information. Along with it is the activity of analyzing the strength of a cipher by subjecting it to several forms attack. This course covers the basic concepts of Cryptography, certain cryptographic algorithms and its applications.

**Module 1: Introduction to Cryptography**

The Confidentiality, Integrity & Availability (CIA) Triad, Cryptographic concepts, methodologies &practices, Symmetric& Asymmetric cryptography, public& private keys, Cryptographic algorithms and uses, Construction& use of Digital signatures

**Module 2: Types of Algorithms**

The basic functionality of hash/crypto algorithms (DES, RSA, SHA, MD5, HMAC, DSA) and effects on key length concepts in Elliptical Curve Cryptography & Quantum Cryptography

**Module 3: Key Management**

The basic functions involved in key management including creation, distribution, verification, revocation and destruction, storage, recovery and life span and how these functions affect cryptographic integrity

**Module 4: Application of Cryptography**

Major key distribution methods and algorithms including Kerberos, ISAKMP etc., Vulnerabilities to cryptographic functions, the Use and functions of Certifying Authorities (CAs),Public Key Infrastructure (PKI) and System architecture requirements for implementing cryptographic functions

**Books for Reference:**

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole
2. Cryptography and Security by C K Shyamala, N Harini and Dr T R Padmanabhan – Wiley Publications, First Edition

**Course: Principles of Virtualization**

**Course Objective:**

Virtualization is the single most effective way to reduce IT expenses while boosting efficiency and agility in organizations. This unit explores the implementation and usage of VMWare Virtualization, its installation process and the working of Windows Server hyper V.

**Module 1: Basics of Virtualization**

Understanding Virtualization, Need of Virtualization and Virtualization Technologies: Server Virtualization, Storage Virtualization, I/O Virtualization, Network Virtualization, Client Virtualization, Application virtualization, Desktop virtualization, Understanding Virtualization Uses: Studying Server Consolidation, Development and Test Environments , Helping with Disaster Recovery

**Module 2: Deploying and Managing an Enterprise Desktop Virtualization Environment**

configure the BIOS to support hardware virtualization; Install and configure Windows Virtual PC: installing Windows Virtual PC on various platforms (32-bit, 64-bit), creating and managing virtual hard disks, configuring virtual machine resources including network resources, preparing host machines; create, deploy, and maintain images

**Module 3: Deploying and Managing a Presentation Virtualization Environment**

Prepare and manage remote applications: configuring application sharing, package applications for deployment by using RemoteApp, installing and configuring the RD Session Host Role Service on the server.

**Module 4: Accessing Published Applications**

Access published applications: configuring Remote Desktop Web Access, configuring role-based application provisioning, configuring Remote Desktop client connections. Configure client settings to access virtualized desktops: configuring client settings

**Module 5: Understanding Virtualization Software**

List of virtualization Software available . Vmware- introduction to Vsphere, ESXi, VCenter Server and Vsphere client. Creating Virtual Machine.. Introduction to HYPER-V role. Create Virtual Machines. Create Hyper-v virtual networking, Use virtual Machine Snapshots. Monitor the performance of a Hyper-v server, Citrix XENDesktop fundamentals

**Reference Books:**

1. Virtualization with Microsoft Virtual Server 2005 by Twan Grotenhuis, Rogier Dittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam, Syngress Publications, 2006
2. Virtualization--the complete cornerstone guide to virtualization best practices, Ivanka Menken, Gerard Blokdijk, Lightning Source Incorporated, 2008
3. Virtualization: From the Desktop to the Enterprise, Chris Wolf, Erick M. Halter, EBook, 2005

**Course: Desktop Operating System**

**Course Objective:** Operating system is the basics of any technology or application that is being developed. A good understanding of any OS is very much essential for every computer technology aspirant to reap maximum performance out of the machines. File systems, storage mechanisms, security aspects, Protocols functioning and policy implementations are some of the basic concepts learnt in this subject.

**Module 1 Introduction to Operating System**

Introduction to Operating System, Evolution of operating system, Structure of Operating, OS Operations OS Organizations, Distributed Systems, Open source Operating systems, Process Management, Memory Management, Storage Management, Computing Environment

**Module 2 Installing, Upgrading and Managing Windows – 7**

Gathering hardware devices, preparing to install windows 7, upgrading and migrating to windows 7, Clean and Image based installation, Configuring Application Compatibility, administrating windows features, Disk management, and installing and configuring device drivers

**Module 3 File Access, Printers and Network Connectivity with Windows – 7**

Introduction to Authentication and Authorization, Managing file access , Shared Folders, File compression, file archiving, managing printers, connecting windows 7 client with server, configuring ipv4 & ipv6 connectivity, Implementing APIPA, Introduction to Name resolution, troubleshooting network issues, Overview of wireless network, configuring wireless network

**Module 4 Securing, Optimizing and Maintaining Windows 7 Client**

Overview of local security management, local security policy settings, EFS and Bitlocker, Application restrictions, UAC, Windows Firewall, Administrating IE8, Windows Defender

**Module 5 Configuring Mobile Computing and Remote Access in Windows 7**

Configure Mobile computer and device settings, Remote desktop, remote assistance, direct access, branch cache

**Text Book:**

1. Milan Milenkovic - Operating Systems – TATA McGRAW HILL, 2009

**Reference Books:**

1. Operating Systems Fundamentals D. Irtegov, 2005

2. A Short Introduction to Operating Systems (M. Burgess), 2010

3. Operating Systems: Design and Implementation (Second Edition)., Andrew S. Tanenbaum, 2010

**Course: Routing Laboratory**

**List of experiments:**

1. Switch Configuration - Basic Commands
2. Switch Configuration - Switch Port Security
3. Router - Configuration
4. Configuration of IP Address for a Router
5. Setting up of Passwords
6. PPP Encapsulation, PPP PAP Authentication, PPP CHAP Authentication
7. Configuration of Static and Dynamic Routing
8. Configuration of Default Route
9. Implementation of EIGRP
10. Implementation of OSPF
11. VLAN Configuration
12. Switch Troubleshooting
13. Configuration of Access-lists - Standard & Extended ACLs
14. Cisco Discovery Protocol
15. DHCP, DHCP Relay & DHCP Exclusions
16. Configuring Logging to a Remote Syslog Server

**Course: Desktop Operating System Laboratory**

**List of experiments**

1. Installing Windows 7
2. Using Windows Upgrade Advisor or Upgrade Assistance
3. Migrating to Windows 7 using Windows Easy Transfer and User State Migration Tool
4. Creating a Small Office Network or Home Network.
5. Configuring TCP/IP in Windows.
6. Sharing Resources in Windows
7. Creating Users and Groups
8. Performing a Windows Update
9. Capturing image of existing installed operating system and deploy it to another system using imagex.
10. Configuring disk partitions, Virtual HD in Disk Management.

**SEMESTER 5**

**Course: Reasoning and Thinking –I**

**Course Objective:** It is the objective of the students to introduce to the students, concepts like Reasoning and thinking which are very important for any individual in every aspect and walk of life and assists them in taking the right decisions, approach every problem with diligence and perform action accordingly.

**Module 1: Verbal ability**

Synonyms**,** Antonyms and One word substitutes

**Module 2: Basic quantitative aptitude**

Speed, Time and Distance, Time and Work, Linear Equations, Progressions (Sequences & Series), Permutation and Combination, Probability, Functions, Set Theory, Number Systems, LCM and HCF, Percentages, Collection and Scrutiny of data: Primary data, questionnaire and schedule; secondary data, their major sources including some government publications.

**Module 3: Logical Reasoning - I**

Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism

**Reference Books:**

1. Richard I Levin, David S. Rubin: Statistics for Management, Pearson Prentice Hall Education Inc. Ltd, NewDelhi, 5th Ed. 2007
2. Bajpai, N. Business Statistics, Pearson, 2010
3. Sharma J.K., Business Statistics, Pearson Education India, 2010.
4. Anderson; David R, Dennis J. Sweeney and Thomas A. Williams, Quantitative Methods for Business, Prentice-Hall, WestPublishing Company, 1996.
5. CAT Complete course, UPKAR publications

**Course: Datacenter Fundamentals**

**Course Objective:** This course covers the significance, setting-up and Services provided by data centers. Datacenter fundamentals helps students to understand the basic concepts of Datacenter architecture, network infrastructure in a Datacenter, server frames fault tolerance, Datacenter availability, network implementation and disaster recovery.

**Module 1: Overview of Data Centers**

Datacenters Defined, Datacenter Goals, Datacenter Facilities, Roles Datacenters in the Enterprise, Roles of Datacenters in the Service Provider Environment, Application Architecture Models. The Client/Server Model and Its Evolution, The n-Tier Model, Multitier Architecture Application Environment, DataCenter Architecture

**Module 2: Data Center Requirements**

DataCenter Prerequisites, Required Physical Area for Equipment and Unoccupied Space, Required Power to Run All the Devices, Required Cooling and HVAC, Required Weight, Required Network Bandwidth, Budget Constraints, Selecting a Geographic Location, Safe from Natural Hazards, Safe from Man-Made Disasters, Availability of Local Technical Talent, Abundant and Inexpensive Utilities Such as Power and Water, Selecting an Existing Building (Retrofitting), tier standard

**Module 3: DataCenter Design**

Characteristics of an Outstanding Design, Guidelines for Planning a Data Center, Data Center Structures, No-Raised or Raised Floor, Aisles, Ramp, Compulsory Local Building Codes, Raised Floor Design and Deployment, Plenum, Floor Tiles, Equipment Weight and Tile Strength, Electrical Wireways, Cable Trays, Design and Plan against Vandalism

**Module 4: Introduction to Server Farms**

Typesof server farms and data centre, internet server farm, intranet server farm, extranet server farm , internet datacenter, corporate datacenter, software defined datacenter, datacenter topologies, Aggregation Layer, Access Layer, Front-End Segment, Application Segment, Back-End Segment, Storage Layer, DataCenter Transport Layer, DataCenter Services, IP Infrastructure Services, Application Services, Security Services, Storage Services

**Module 5: Business Continuity and Disaster Recovery fundamentals**

Business continuance infrastructure services, the need for redundancy, Information availability , BC terminology , BC planning life cycle , BC technology solutions , backup and recovery considerations , backup technologies , Uses of local replicas , Local replication technologies , Restore and restart considerations , Modes of remote replications , remote replication technologies

**Reference Books:**

1. IP Storage Networking by : Gary Oreinstein, Addison Wesley Professional, 2006
2. Information Storage and Management, G. Somasundaram – Alok Srivastava, Wiley; 1 edition (April 6, 2009)
3. Administering Data-Centers, Kailash Jayswal, Wiley; 1 edition (November 28, 2005)

**Course: Network Security**

**Course Objective:**

The power of computers can be witnessed when multiple computers are connected to form a network and start sharing information amongst them. But when this happens, the entire network becomes an open source and exposed to threats due to many users who log into these networks and their environments. Therefore it becomes important to learn about Network Security, in order to safeguard our networks from hackers and damages. Learning network concepts therefore becomes significant and no study of computers is complete without them.

**Module 1: Introduction to Network Security**

Perimeter Security – Overview of Network Security, Access Control, Device Security, Security features on Switches, Firewall, Types of firewall, Access Management, Multifactor Authentication, Wireless LAN (WLAN) Security and Network Admission Control (NAC)

**Module 2: Threats, Vulnerabilities and Attacks**

Threat; Vulnerabilities; Attacks – Application Attack, Network Attack and Mitigating & Deterring Attacks; Network Security – Security through network devices, Security through Network Technologies and Security through Network Design Elements, Administering a Secure Network

**Module 3: Network Security Management**

Secure Socket Layer (SSL) – Introduction to SSL, Open SSL basics, Problems with SSL, Cryptography, Message Digits Algorithms, Digital Signature and Public Key Infrastructure (PKI); Data Privacy – IPsec VPN, Dynamic Multipoint VPN (DMVPN), Group Encrypted Transport VPN (GET VPN), Secure Sockets Layer VPN (SSL VPN) and Multiprotocol Label Switching VPN (MPLS VPN).

**Module 4: Network Security Controls**

Network Intrusion Prevention – Overview of Intrusion Prevention System (IPS), Intrusion Detection System (IDS),Deploying IPS and IPS high Availability; host Intrusion Prevention; Anomaly Detection and Mitigation

**Module 5: Network Management**

Security Monitoring and correlation; Security Management - Security and Policy Management and Security Framework and Regulatory Compliance; Best Practices Framework, Case Studies.

**Reference/ Text Books:**

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole
2. Network Security Bible by Eric Cole

**Course: Installation and Configuration of Server**

**Course Objective:**

This course helps to learn how to plan for a server installation, server roles, server upgrades. It covers the implementation and configuration of core services, networking services, and Hyper-V configuration. Topics include installing and configuring servers, Implementing Local Storage, Implementing File and Print Services, Implementing Group Policy, Implementing Server Virtualization with Hyper-V. Upon completing the course, the students will learn implementing, managing, maintaining, and provisioning services and infrastructure in a server environment

**Module 1: Installing and Configuring Servers**

**Selecting a Windows Server 2012:-** Edition, Supporting Server Role, Supporting Server Virtualization, Server Licensing. **Installing Windows Server 2012:** System Requirement, Performing a Clean Installation, Installing Third-Party Drivers, Working with Installation Partitions, Using Server Core, Server Core Defaults, Server Core Capabilities, Using the Minimal Server Interface, Upgrade paths, Preparing to Upgrade Installation, Installing Windows Server Migration Tools.

**Configuring Servers:** Completing Post-Installation Tasks and GUI Tools, Converting Between GUI and Server, Configuring NIC Teaming, Using Roles, Features, and Services, Using Roles Manager, Adding Roles and Features, Deploying Roles to VHDs, Configuring Services

**Module 2: Configuring Local Storage**

Planning Server Storage, Determining the Number of Servers Needed, Estimating Storage Requirements, Selecting a Storage Technology, Selecting a Physical Disk Technology, Using External Drive Arrays, Planning for Storage Fault Tolerance, Using Disk Mirroring, Using RAID, Using Storages Spaces, Understanding Windows Disk setting, selecting a Partition style, understanding disk and Volume Types, Choosing a Volume Size, Understanding File System, Working with Disks, Adding a New Physical Disk, Creating and Mounting VHDs, Storage Pool, Virtual Disks, Simple Volume, Creating a Striped, Spanned, Mirrored, or RAID-5 Volume, Extending and Shrinking Volumes and Disks

**Module 3: Configuring File and Share Access**

Designing a File-Sharing Strategy, Arranging Shares, Controlling Access, Mapping Drives, Creating Folder Shares, Assigning Permissions, Understanding the windows Permission Architecture and Basic, Advanced Permissions, Allowing and Denying Permissions, Inheriting Permissions, Understanding Effective Access, Setting Share Permissions, Understanding NTFS Authorization, Assigning Basic NTFS Permissions, Understanding Resource Ownership, Combining Share and NTFS Permissions

**Module 4: Configuring Print, Document Services, Servers for Remote Management.**

Understanding the Windows Print Architecture and Printing, Server Printing Flexibility, sharing a Printer Drivers and Managing Printer Drivers, Using Remote Access Easy Print, Configuring Printer Security, Adding Printer Servers, Deploying Printers with Group Policy, Adding Server and Workgroup Servers, Calibrating Server Manager Performance, Configuring WinRM and Windows Firewall, Creating Server Groups, Using Remote Server Administration Tools, Using Windows PowerShell Web Access, Installing Windows PowerShell Web Access, Configuring the Windows PowerShell Web Access Gateway, Configuring a Test Installation, Customizing a Gateway Installation, Creating Authorization Rules, Working with Remote Servers

**Module 5: Creating and Configuring Virtual Machine Settings and Storage**

Virtualization Architectures, Hyper-V Implementations and Licensing, Hyper-V Hardware Limitations and Server, Installing Hyper-V, Using Hyper-V Manager, Creating a VM, Installing an Operating System, Configuring Guest Integration Services, Allocating Memory, Using Dynamic Memory, working with Virtual Disks, Understanding Virtual Disk Formats, Creating Virtual Disks, Creating a New Virtual Disk, Adding Virtual Disks to Virtual Machines, Creating Differencing Disks, Configuring Pass-Through Disks, Modifying Virtual Disks, Creating Snapshots, Connecting to a SAN, Connecting Virtual Machines to a SAN

**Reference Books:**

1. Windows Server 2012: A Handbook for Professionals by [Aditya Raj](http://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Aditya+Raj&search-alias=stripbooks) (Author)
2. MCSA 70-410 Cert Guide R2: Installing and Configuring Windows Server 2012 (Certification Guide) Hardcover – Import, 12 Sep 2014 by [Don Poulton](http://www.amazon.in/Don-Poulton/e/B001JS6IGM/ref=dp_byline_cont_book_1) (Author), [David Camardella](http://www.amazon.in/s/ref=dp_byline_sr_book_2?ie=UTF8&field-author=David+Camardella&search-alias=stripbooks) (Author)

**Text Books:**

1. Installing and Configuring Widows Server 2012 by Craig Zacker
2. Mastering Windows Server 2012 R2 by Mark Minasi, Kevin Greene, Christian Booth, Robert Butler

**Course: IT Governance Risk and Information Security Management**

**Course Objective:**

The unit primarily covers the importance of IT and IS Governances and the best practices followed by the Role of Steering committee and Chief Information Security Officer. The Unit also deals with the Risk management and the Information Security Management Practices including Hiring, Training, Promotion, Performance Evaluation, Required Vacations and Termination Policies, Sourcing Practices and Strategy for Information Security. The Unit also covers the Committee of Sponsoring Organizations and its importance and applicability, Sarbannes Oxley Act and its implications to the Industry.

**Module 1: IT Governance**

Introduction & Concepts, Role of Governance in Information Security, Best Practices for IT Governance. Role of IT Strategy Committee, Standard IT Balanced Scorecard. Val-IT framework of ISACA

**Module 2: Information Systems Strategy**

Role of Strategic Planning for IT, Role of Steering committee, Policies and Procedures

**Module 3: Risk Management Program**

Develop a Risk Management Program. Risk Management Process. Risk Analysis methods. Risk-IT Framework of ISACA

**Module 4: Information Security Management**

Introduction, Performance Optimization, IT Security roles & responsibilities, Segregation of Duties, Description of COBIT and other Frameworks

**Reference Book:**

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole

**Course Name: Introduction to Cloud Computing**

**Course Objective:**

Cloud computing is a colloquial expression used to describe a variety of different computing concepts that involve a large number of computers involves a large number of computers that are connected through a real-time communication network. In science, cloud computing is a synonym for distributed computing over a network and means the ability to run a program on many connected computers at the same time. This course covers basic concepts of cloud types, services and security etc.

**Module 1: Introduction**

Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of clouds, Private Public and hybrid clouds, Cloud Computing architecture, Cloud computing infrastructure, Merits of Cloud computing, , Cloud computing delivery models and services (IaaS, PaaS, SaaS), obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, Practical applications of cloud computing.

**Module 2: Cloud Computing Companies and Migrating to Cloud**

Web-based business services, Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud., Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies

**Module 3: Cloud Cost Management and Selection of Cloud Provider**

Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, Selecting the right scalable application. Considerations for selecting cloud solution. Understanding Best Practices used in selection of Cloud service and providers, Clouding the Standards and Best Practices Issue: Interoperability, Portability, Integration, Security, Standards Organizations and Groups associated with Cloud Computing, Commercial and Business Consideration

**Module 4: Governance in the Cloud**

Industry Standards Organizations and Groups associated with Cloud Computing, Need for IT governance in cloud computing, Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, API integration. Legal Issues: Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Legal issues in Commercial and Business Considerations

**Module 5: 5 ten cloud do an do nots.:**

Don’t be reactive,do consider the cloud a financial issue, don’t go alone, do think about your architecture, don’t neglect governance, don’t forget about business purpose, do make security the centerpiece of your strategy, don’t apply the cloud to everything, don’t forget about Service Management, do start with a pilot project.

**Reference Books:**

1. Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010
2. Handbook on Cloud Computing, Borivoje Furht, Armando Escalante, Springer, 2010

**Text Book:**

1. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011

**Course Name: Network Security Laboratory**

**List of experiments**

1. Firewall Configuration

2. VPN Configuration

3. IDS Configuration

4. Router Security

5. Traffic Monitoring using WireShark

7. Traffic Monitoring

8. Network Security risk assessment

10. Network security policies and standards

12. VLANs & Wireless LANs

14. Defence in Depth & DMZs

16. Network Security for BYODs

**Course Name: Installation and Configuration of Server- Laboratory**

**List of experiments:**

1. Installation of Windows Server 2012
2. Configuration of Windows Server
3. Configuration of Local Storage for Windows Server
4. Configuration of File and Share Access for Windows Server
5. Configuration of Print and Document Services for Windows Server
6. Configuration of Windows Server for Remote Management
7. Creating Virtual Machine in Windows Server
8. Configuring and Setting Virtual Machine

**SEMESTER 6**

**Course: Administration of Server**

**Course Objective:** This course validates the skills and knowledge necessary to administer a Server Infrastructure in an enterprise environment. Topics include Deploy and manage server pages, implement patch management, monitor servers, Configure Distributed File System (DFS), File Server Resource Manager (FSRM), file and disk encryption, audit advanced policies, Understanding DNS and DNS Zones and Records. Upon completion of this course, the students will gain understanding and hands-on experience to design, install, administer, and optimize servers and related components to achieve high performance of the various functions supported by the servers and ensure the availability of client/server applications, configuring all new implementations, and developing processes and procedures for ongoing management of the server environment

**Module 1: Deploying and Managing Server Images**

How to Install the Windows Deployment Service Role, How to Configure the WDS Server, Configuring the WDS Properties, Starting WDS, Configuring the Custom DHCP Option, Configuring and Managing Boot, Install, and Discover Images, How to Add Boot Images, Adding Image Files, Creating an Image File with WDS, Creating a Discover Image, Using Wdsutil, performing an Unattended Installation, How to Install Features for Offline Image, Deploying Driver Packages with an Image

**Module 2: Implementing Patch Management and Monitoring Servers**

Understanding windows Updates and Automatic Updates, Deploying Windows Server Update Services(WSUS), How to Install and Configure WSUS, Configuring WSUS Synchronization, Configuring WSUS Computer Groups, Configuring Group Policies for Updates, Configuring Client-Side Targeting, Approving Updates, Viewing Reports, Administrating WSUS with Commands, Troubleshooting Problems with Installing Updates, Introducing the Microsoft Management Console(MMC), Using Server Manager, Using Event Viewer, Understanding Logs and Events, Adding and Filtering Events, Managing Performance, Using Task Manager, Using Resource Monitor, Configuring Data Collector Sets(DCS), Monitoring the Network using Netstat and protocol analyzers

**Module 3: Configuring Distributed File System (DFS) and Configuring File Server Resource Manager (FSRM)**

Using Distributed File System, Installing and Configuring DFS Namespace, Managing Referrals, Managing DFS Security, Installing and Configuring DFS Replication, Scheduling Replication, Configuring Remote Differential Compression, Configuring Staging, Configuring Fault Tolerance Using DFS, Installing File Server Resource Manager, Using, creating, changing Quotas, Managing Files with File Screening, Creating File Groups, Creating a File Screen Creating a File Screen Exception, Creating a File screen Template, Using Storage Reports Enabling SMTP

**Module 4: Configuring File Services, Disk Encryption and Configuring Advance Audit Policies**

How to Securing Files, Encryption files with EFS, Configuring EFS, Using the Cipher Command, Sharing Files Protected with EFS with others, Configuring EFS with Group Policies, Configuring EFS Recovery Agent, Managing EFS Certificates, Encrypting Files with BitLocker, Configuring BitLocker Encryption, configuring BitLocker to Go, Configuring BitLocker Policies, Managing BitLocker Certificates, Configuring the Network Unlock Features, Enabling and configuring Auditing, Implementing Auditing Using Group Policies, Implementing and Audit Policy, Implementing Object Access Auditing Using Group Policies, Implementing Advance Audit Policy Setting

**Module 5: Configuring DNS Zones and Records**

Understanding DNS, Understanding DNS Names and Zones, Understanding the Address Resolution Mechanism, configuring and Managing DNS Zones, Installing DNS, Configuring Primary and Secondary Zones, Configuring Active Directory-Integrated Zones, configuring Zone Delegation, configuring Stub Zones, configuring Caching-Only Servers, Configuring Forwarding and Conditional Forwarding, Configuring DNS Record types, creating and Configuring DNS Resource Records, Start of Authority(SOA) Records, Name Server(NS) Records, Host(A and AAAA) Records, Canonical Name(CNAME) Records, Pointer(PTR) Records

**Reference Books:**

1. Administering Widows Server 2012 by Patrick Regan
2. Mastering Windows Server 2012 R2 by Mark Minasi, Kevin Greene, Christian Booth, Robert Butler

**Text Books:**

1. Windows Server 2012: A Handbook for Professionals by [Aditya Raj](http://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Aditya+Raj&search-alias=stripbooks) (Author)
2. Administering Windows Server 2012 (Certification Guide) by Orin Thomas

**Course: Ethical Hacking**

**Course Objective:**

The course primarily covers the Ethical hacking methodology and its different stages which include the Foot printing, Scanning, Enumeration and System hacking techniques and a broad knowledge about white box and black box testing. The Unit describes a wide range of attacks that can cause adverse negative effects on IT systems that include Denial of service, Session hijacking and severe vulnerabilities that can be seen in Web Applications. The Unit also covers hacking attacks caused in other Operating System environment like Linux and the secret techniques to Evade Firewalls. The Unit not only captures valuable information on vulnerabilities and threats but also covers an effective way of report making methodology that can helps the top level management to take immediate decisions on mitigating the threats.

**Module 1: Introduction to Ethical Hacking**

Ethical Hacking concepts and essential terminology. Different phases involved in an exploit by a Hacker. Overview of Attacks and Identification of Exploit Categories. Legal implications of Hacking. Hacking, Law and Punishment

**Module 2: Ethical Hacking Phases**

Essential terms like Hacker, Hacking, Cracker, Ethical Hacker, Threat, Vulnerability, Target of Evaluation, Attacks and Exploits. Elements of Security and how Hacking impacts these elements.

**Module 3: Scanning & Enumeration**

Scanning as a part of the pre-attack phase. Use of dialers, port scanners, network mapping, sweeping, vulnerability scanners etc. Usage of Open source tools for scanning. Gaining Access phase of the attack including how the attack occurs

**Module 4: Penetration Techniques and Tools**

Maintaining access phase where the hacker tries to retain ownership of the system. Techniques & tools used by hackers to maintain access. Covering tracks Phase of the hacking activity including removal of evidence of hacking to avoid forensics & legal action.

**Module 5: Report Writing and Mitigation**

Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking

**Reference/ Text Book:**

1. The CEH Prep Guide: The Comprehensive Guide to Certified Ethical Hacking, by Ronald L. Krutz (Author), Russell Dean Vines,Wiley Publication

**Course: Virtualization and Cloud Security**

**Course Objective:**Server virtualization is today’s most rapidly-evolving and widely-deployed technologies. Highly beneficial to organizations in terms of cost and ease of deployment and management of virtualized servers, deploying desktop, application and network virtualization is in demand. Beginning from basics of virtualization and Cloud Security, students proceed to more detailed topics in Cloud like Cloud Trust Protocol & Transparency and Cloud Controls Matrix.

**Module 1: Introduction to Virtualization & Cloud**

Virtualization and Cloud computing concepts, Private cloud Vs Public cloud, IAAS, PAAS & SAAS concepts, Virtualization security concerns, Hypervisor Security, Host/Platform Security, Security communications, Security between Guest instances, Security between Hosts and Guests

**Module 2: Cloud Security**

Cloud Security vulnerabilities and mitigating controls, Cloud Trust Protocol, Cloud Controls Matrix. Complete Certificate of Cloud Security Knowledge (CCSK)

**Module 3: Cloud Trust Protocol & Transparency**

Introduction to Cloud Trust Protocol & Transparency, Cloud Trust Protocol and Transparency, Transparency as a Service, Concepts, Security, Privacy & Compliance aspects of cloud

**Module 4: Cloud Controls Matrix &Top Cloud Threats**

Introduction to Cloud Controls Matrix & Top Cloud Threats, Cloud Controls Matrix, Trusted Cloud Initiative architecture and reference model, requirements of Security as a Service (Secaas) model and Top Security threats to the cloud model

**Reference Book:**

1. Cloud Security – A comprehensive Guide to Secure Cloud Computing by Ronald L. Krutz and Russel Dean Vines

**Course: Linux Server Administration**

**Course Objective:**

RHEL is a high performing operating system that. RHEL 6 is the sixth generation of the long term and predictable operating platform. With the flexibility to deploy on physical hardware, as a virtual host, as a virtual guest or in the cloud, Red hat Enterprise Linux 6 is the ideal foundation for next-generation datacenters. The fresh system administrators need to have a strong functional knowledge of RHEL 6 in any current IT work environment. The unit explores the security and network access controls in Linux, organizing network system and Mail Services, Securing Data and Account Management.

**Module 1: Fundamentals of Linux:**

Development of Linux, Linux Distributions. Structure of Linux Operating System, Logging In and General Orientation, The X Window System, KDE, GNOME. Navigating the File Systems, Managing Files, File Permission and Access, Shell Basics, Shell Advanced Features, File Name Generation. Common Unix commands

**Module 2: Administration of Linux OS**

Installing Linux, Configuring Disk Devices, Creating and Managing File Systems, File System Backup, Kickstart Installation, Linux Boot Loaders, Linux Kernel Management, Managing User Accounts, Understanding File Listing, Ownership and Permission, Managing Software using RPM, Connecting to Network, Linux Network Services, Setting up a Printer

**Module 3:Input and Output Redirection**

Input Redirection, Output Redirection, Error Redirection, Filter, Pipes. Networking in Linux: Network Connectivity, IP address, Accessing Remote system, Transferring files, and Internet configuration. Process Control: Identifying Process, Managing Process, Background Processing, Putting jobs in Background. Offline File Storage: Storing files to Media Booting process and User

**Module 4: Linux Basic networking and naming service**:

Introduction to Networking, Networking, Internet Network Services, Dynamic DNS, Electronic Messaging, Apache, NIS and Network File Sharing: NIS, Network File Sharing, SAMBA. Security: Defining System Security Policies, System Authentication Services and Security, Securing Services, Securing Data and Communication

**Module 5: The UNIX File System**

Inodes - Structure of a regular file – Directories - Conversion of a path name to an inode - Super block - Inode assignment to a new file - Allocation of disk blocks. System calls for the file System: Open – Read - Write - Lseek – Close - File creation - Creation of special files - Changing directory and root - changing owner and mode – stat and fstat - pipes - Dup - Mounting and Un mounting file systems - Link and Un link.

**Reference Books:**

1. The Complete Reference, Linux Sixth Edition by Richard Petersen.
2. Red Hat ®Enterprise Linux® 6 Administration by Sander van Vugt
3. Linux System Administration by Paul Cobbaut.

**Course: Advanced Storage Management**

**Course Objective:** Storage Technology is a highly important aspect of Computer technology as it involves methods to protect information and data, which is at the heart of every organization. This data needs to be safeguarded or managed in such a way that it can be accessed readily or speedily restored in the event of a hardware failure.

Students will begin by understanding the basic principles of data storage like storage topologies and comparison between different topologies. Hardware is an important aspect of storage as we need a medium to store data. A unit which covers different types of protocols is also included. Due to the significance of data and need to protect it from hardware failure, storage security becomes very important to learn from student’s perspective and this is dealt in the last section.

**Module 1: Introduction to Data-Storage**

Importance of Data, Data Growth and Demands on Data, Storage Evolution, Storage Topologies, DAS – Advantages and Limitation, NAS – Advantages and Limitation, SAN – Advantages and Limitation, Comparing DAS, NAS and SAN

**Module 2: Storage Hardware & Ecosystem**

Host Bus Adapters, SFPs, FC Cables and Connectors, SCSI/SATA/SAS Cables and, Connectors, Disk Drive, Host Bus Adapters, JBODs, External Storage Boxes, Tape Drive, Tape Library, Fiber Channel, Switches, Bridges, FC Appliances

**Module 3: Storage Protocols**

ATA and SATA, SPI – Parallel SCSI, Limitations of Parallel SCSI, SAS – Serial Attached, SCSI, SAS Topology, SAS Devices, Benefits of SAS

**Module 4: iSCSI , RAID , Fibre Channel**

iSCSI Topology, iSCSI Initiators and Targets, iSCSI Names and Addresses, Speeding Up, iSCSI, iSCSI Advantages, iSCSI Limitation, Comparing Storage Protocols. **RAID:** why RAID, RAID Levels, RAID 0 – 6, DP, Nested RAID Terminology, Comparison of RAID Levels, RAID Characteristics, RAID Performance, RAID in Software, RAID in Hardware. **Fiber Channel:** FC Topologies, FC Ports, FC Protocol Layers, FC WWNs, FC Addresses, FC Frame, FC Flow Control, Zoning, LUN Masking, FC Strength and Limitation

**Module 5: Storage Security and Managing the Storage infrastructure**

Storage Security framework, Risk Triad, storage security domains, security implementation in storage networking. **Managing the Storage Infrastructure:** Monitoring the storage infrastructure, storage management activities, storage infrastructure management challenges and developing an ideal solution.

**Reference Books:**

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley; 1 edition (April 6, 2009)

**Text Books:**

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

**Course: Mobile Wireless and VOIP Security**

**Course Objective:** Basic understanding of security in wireless world is very important for any IT Security Professional. As organizations are increasingly adapting VoIP for converged messaging, call centres and interactive multimedia collaboration, implementing security principles is vital for maintaining confidentiality and privacy.

**Module 1: Introduction to Mobile communication**

Mobile & Telecommunication protocols and their vulnerabilities, Gain knowledge of managerial, technical and procedural controls to address Mobile & Telecommunication vulnerabilities

**Module 2: Wireless Security**

Wireless protocols and their vulnerabilities, Gain knowledge of managerial, technical and procedural controls to address Wireless vulnerabilities

**Module 3: Voice over Internet Protocol (VOIP) Security**

VOIP concepts, protocols and vulnerabilities, Gain knowledge of managerial, technical and procedural controls to address VOIP vulnerabilities

**Module 4: Mobile Forensics & Data Extraction**

Mobile forensics process including seizure, data acquisition types like Physical, Logical, Manual, External & Internal memory, storage, analysis using tools & techniques

**Books for Reference**

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole
2. Network Security Bible by Eric Cole – Second Edition

**Course: Linux Server Administration – Laboratory**

**List of experiments:**

Configure the following tasks & verify it. (Hint - use grep/cut/tr/sed)

a) List the lines containing "/sbin/nologin" from the /etc/passwd file.

b) List only lines of output from ps, which lists running processes that contain the string "init".

c) Display the list of GIDs from /etc/passwd file.

d) Alter all the letters that starts from range "a-f" to "A-F" in /etc/passwd file.

2) Create an alias named eth0:0 using below credentials in RHEL 5 and verify it.

(a) IP ADRESS = 172.16.0.1 (b) 255.255.0.0

(c) Default Gateway = 172.16.0.254 (d) DNS 1 = 4.2.2.1

3) Configure password policy for user john with below arguments in RHEL 5. After configuration verify the policy applied.

(a) Minimum password age = 4 days

(b) Maximum password age = 15 days

(c) Inactive days = 2 days

(d) Account Expiration date = 6 months from today

4) Configure the following tasks:

(a) Add user accounts to your system: Joshua, alex, dax, bryan, zak, ed and manager. Assign each user this password: 123@iMs.

(b) Add the groups to your system: sales with GID: 1000, HR with GID: 1100 and web with GID: 1200.

(c) Add Joshua and alex to the sales group, dax and bryan to the HR group, zak and ed to the web group and add manager to all of these groups.

(d) Login with each user & verify using id command that they are in the appropriate groups.

5) Use ACL to accomplish these tasks:

(a) Create groups named Admin and Web.

(b) Create users named John and Jimmy.

(c) Create a new directory named /depts/tech/. Change the permission so that root is the owner and Admin is the group owner.

(d) Use ACL to give full permission for /depts/tech/ to the Web group.

(e) Allow John read/execute but not write permission on the /depts/tech/ directory.

(f) Allow Jimmy full permission on the /depts/tech/ directory.

6) You are tasked with finding all SUID & SGID files under the / directories.

7) Configure your system that boots to run level 3 by default. Configure X server using command in run level 3.

8) Devise a ps command that does the following. (Hint: sort/ps/top)

(a) List all processes.

(b) For each process, prints the information which displays the percentage of CPU usage, the process ID & name of the command that created it.

(c) The output is sorted by the %cpu value from highest to lowest

9) Explain the suid, sgid & sticky bit permission with example

10) Customize the Bash prompt as per given tasks (Hint - PS1)

(a) Display the current value of primary prompt string.

(b) Changes prompt to print a static string "ITIMS -'".

(c) Restore the original prompt.

(d) Insert the bash history prompt special character "\!" between the hostname and dollar-sign.

11) Configure given tasks for package management: (Hint: use rpm command)

(a) Check whether ftp package is installed or not.

(b) If it is not installed, install it & verify it.

(c) Display the configuration files available through this package.

(d) Be sure that ftp service must be enabled at startup.

12) Use rpm queries to answer the following questions.

(a) What files are in the "initscripts" package?

(b) Which installed packages have "gnome" in their names?

(c) Which RPM provides /etc/inittab?

13) Prepare a cron job that take the backup of /home at 5:00pm on every Saturday.

14) Change your system date to 1:00pm March 1990.

15) Copy /etc/fstab file to /tmp directory as newfstab file. The user owner is Jack and group owner is admin. Give full permission to user owner and read, write permission to group owner. No permission to others.

16) Configure your system such that SELinux must be in enforcing mode and firewall is enables and ssh service is not allowed through your firewall.

17) Configure ftp server such that anonymous can download and upload the data to ftp server. Deny users John and Carel to access the ftp server. Note that your ftp server must be accessible in your private network only. It can't be accessible in another network.

18) Create a RAID level 1 on /dev/md0 device by creating two equal partitions of 100MB size and mount it on /data. The RAID device must be mounted at the time of system startup.

19) Configure LVM in volume group named volgrp by creating 2 partitions of 100MB size and mount it on /exam directory. The initial size of LVM is approximately 40MB and after extending the size of LVM is 80MB.

21) Configure the DHCP server such that your DHCP server will able to provide IP configuration to 65 systems in your network.

22) Configure the station as NFS server such that /share directory is shared & only accessible in your network. This NFS share should be automatically mounted on remote client using autofs. On remote client system, NFS share should be mounted on /data/share directory.

23) Configure stationx.example.com for quota such that when user neo type

dd if=/dev/zero of=/quota/somefile bs=1024 count=30, he succeed. When he type

dd if=/dev/zero of=/quota/somefile bs=1024 count=70 he fails

**Course: Ethical Hacking Laboratory**

**List of experiments**

1. Passive Reconnaissance using “Who is” and Online tools
2. Active Reconnaissance using “Sampad” and web site details
3. Full Scan, Half Open Scan and Stealth scan using “nmap”
4. UDP and Ping Scanning using “Advance Lan Scanner” and “Superscan”
5. Packet crafting using “Packet creator” tools
6. Exploiting NetBIOS vulnerability
7. Password Revelation from browsers and social networking application
8. Creating and Analyzing spoofed emails
9. Creating and Analyzing Trojans
10. OS password cracking

**SEMESTER 7**

**Course: Reasoning and Thinking – II**

**Course Objective:** Students will continue to learn advance concepts in this subject like central tendency and presentation of data which will help them solve complex scenarios

**Module 1: Logical Reasoning - II**

Recap on Reasoning and Thinking -I, Blood Relations; concept of a statistical population and sample from a population; qualitative and quantitative data

**Module 2: Measures of Central Tendency**

Objective of averaging, characteristics of good average, types of average, arithmetic mean of grouped and ungrouped data, correcting incorrect values, weighted arithmetic mean, Median - median of grouped and ungrouped data merit and limitation of median, computation of quartile, decile and percentile, Mode - calculation of mode of grouped and ungrouped data, merits and limitation of mode, relationship between mean, median and mode. Geometric mean and Harmonic mean.

**Module 3: Presentation of Data**

Construction of tables with one or more factors of classification; Diagrammatic and Graphical representation of non-frequency data; Frequency distribution, cumulative frequency distribution and their graphical representation - histogram, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Data Interpretation – Introduction and approaches

**Reference Books:**

1. Richard I Levin, David S. Rubin: Statistics for Management, Pearson Prentice Hall Education Inc. Ltd, New Delhi, 5th Ed. 2007
2. Bajpai, N. Business Statistics, Pearson, 2010
3. Sharma J.K., Business Statistics, Pearson Education India, 2010.
4. Anderson; David R, Dennis J. Sweeney and Thomas A. Williams, Quantitative Methods for Business, Prentice-Hall, West Publishing Company, 1996.
5. CAT Complete course, UPKAR publications

**Course Name: Database Security**

**Course Objective:**

Every program and every application that we use, connect with data or information in some way or the other and this data is stored in a systematic manner in a database, which is chosen depending on the requirements of the software and the users. As data forms a very crucial part of IT and is prone to security threats and attacks, it becomes important to protect the data using technology. This course will teach students, methods to protect databases

**Module 1: The Database and DBMS Architecture**

Introduction to Database & DBMS Architecture, Hierarchical Database Management Systems, Network Database Management Systems, Relational Database Management Systems, Object-Oriented Database Management Systems, End-User Database Management Systems, Spreadsheets

**Module 2: Concepts of Database Security**

Concept of Least Privilege in User ID for databases. Concept of NoSQL databases Differences from classical DBMS concepts with NoSQL, Advantages of NoSQL like Elastic Scaling, Big Data, Goodbye DBAs’, Economics/Cost, Flexible Data models.

**Module 3: Concepts of NoSQL**

Non/ partial applicability of ACID (Atomicity, Consistency, Isolation, Durability) guarantees in NoSQL databases as compared to traditional RDBMS databases. Horizontal scalability benefits of NoSQL Databases compared to traditional Databases, Protecting Database - Understanding permissions, Creating and using database roles, using schemas for security, configuring cross-database security

**Module 4: Concepts of Key Value & Tuple Store Databases**

Concept of UnSQL or Unstructured Query Language, Concept of Key Value & Tuple Store Databases, Concept of Graph Databases, Concept of Multi-model Databases, Code and Data Encryption- Using service and database master keys, creating and using symmetric and asymmetric keys, creating and storing hash values, Authenticating stored procedure by signature

**Module 5: SQL Server &Concepts**

Concept of Object Databases, Concept of Grid & Cloud Databases, Concept of XML databases, Concept of Multidimensional and Multi-value Databases

**Module 6:SQL Server Auditing**

Auditing – Using the profiler to audit SQL server access, using DML trigger for auditing data modification, Using DDL triggers for auditing structure modification, configuring SQL server auditing.

**Text Books**:

1. Database security by Silvana Castano, 2nd Edition, Pub: Addison-Wesley Professional , 2008
2. Microsoft SQL server 2012 Security Cookbook by Rudi Bruchez, Pub: PACKIT publishing, 2012

**Reference Books:**

1. Handbook of database security: Applications and Trends Michael Gertz, Sushil Jajodia, Pub: Springer, Lib. Of congress. 2008
2. Implementing database security and auditing: a guide for DBAs, ...Ron Ben-Natan, Pub: Elsevier, 2005

**Course Name: Advanced Routing**

**Course Objective:** This course describes the architecture, components, and operations of routers in larger and more complex networks. Topics include how to configure routers for advanced functionality, to configure and troubleshoot routers and resolve common issues with OSPF in both IPv4 and IPv6 networks. Other topics include the implementation and configuration of common data link protocols and how to apply WAN security concepts, principles of traffic, access control and addressing services. Students will learn methods to properly configure manage and troubleshoot from fundamentals to advanced routing technologies

**Module 1: Basic Network Principles**

Explain IP operations,Explain TCP operations, Explain UDP operations,**Layer 3 Technologies:** IPv4 addressing, IPv6 addressing, Static Routing, Default Routing, Routing Protocol Types**.**

**Module 2: Routing**

Administrative Distance,Filtering with Any Protocol, Routing Information Protocol version2, Routing Information Protocol next generation.

**Module 3: Routing Protocols**

Enhanced Interior Gateway Routing Protocol, Open Shortest Path First, Redistribution, Manual and Autosummarization, ROUTE maps.

**Module 4: Advanced Routing**

Manual and Autosummarization, ROUTE maps, Loop prevention mechanisms, Border Gateway Protocol, VPN Routing and Forwarding instances lite, VPN Technologies.

**Module 5 : WAN Technologies**

Identify different Wide Area Network Technologies, Wide Area Network serial connection, Point-to-Point Protocol (PPP) connection, Explain Frame Relay.

**Reference Books:**

1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011

**Text Books:**

1. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013
2. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008
3. CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

**Course Name: Advanced Virtualization**

**Course Objective:** Virtualization may be defined as the process of creating something that is not real; like operating system, a server, a storage device or network resources. Presently three areas of Virtualization are being studied, developed and applied by computer professionals all over the globe and they are network virtualization, storage virtualization and server virtualization. To understand any of these streams in detail, it is highly recommended to know the fundamentals of virtualization and some commonly used products like VMware.

**Module 1: VMware Workstation**

What is VMware workstation? journey to the present version from the first version, different features and enhancement of the version , Limitation of the VMware workstation

**Module 2: VMware ESX and ESXi**

VMware ESX and ESXi (ESX/ESXi 5.5), Introduce the architecture of ESX and ESXi, journey to the present version starting from the first version, Known limitations , Managing the configuration of ESX/ESXi, Managing the Installation and configuration of vCenter Server components, Manage vCenter Server inventory objects

**Module 3: Networking**

Networking: Create, configure, and manage vNetwork standard switches, Create, configure, and manage network connections, Create, configure, and manage port groups, Storage: Configure ESX/ESXi with iSCSI, NFS, Create and manage vSphere datastores

**Module 4: Virtual Machines**

Virtual Machines:Deploy virtual machines using VMware vCenter Converter, Resource Monitoring, Control virtual machine access to CPU, memory, and I/O resources, Introduce VM kernel methods for optimizing CPU and memory usage Monitor resource usage using vCenter Server performance graphs and alarms, Data Protection: Back up and recover virtual machines using VMware Data Recovery

**Module 5: Scalability**

Scalability: Manage multiple vCenter Server inventories using VMware vCenter Linked Mode, Manage ESX/ESXi configuration compliance using Host Profiles, Create, configure, and manage vNetwork distributed switches, network connections, and port groups, Configure and manage a VMware Distributed Resource Scheduler cluster High Availability, Configure and manage a VMware High Availability cluster, Configure fault-tolerant virtual machines using VMware Fault Tolerance, Patch Management: Manage patching and patch compliance using vCenter Update Manager

**Reference Books:**

1. Virtualization for Dummies, Bernard Golden, For Dummies; 1 edition (December 5, 2007)
2. Mastering Microsoft Virtualization, Tim Cerling, Jeffrey Buller, Jeffrey L. Buller, Sybex; 1 edition (December 21, 2009

**Text Books:**

1. Virtualization: a beginner's guide - Danielle Ruest, Nelson Ruest , McGraw-Hill Prof Med, 2011,
2. Windows Server 2008 Hyper-V: Insiders Guide to Microsoft's Hypervisor By John Kelbley, Mike Sterling, Allen Stewart, 2010

**Course Name: Elective I- Hacktivism Cyber Warfare and Cyber Terrorism**

**Course Objective:**

Hacktivists and cyber terrorists are a serious threat to information world and the extent of damage possibly caused due to their activities is reaching alarming levels. The reason for this is the availability of better software, tools, techniques and organizational methods. One of the possible methods to stop these attacks is to understand these concepts better and develop programs to protect your personal and organizational information from these attacks.

Students will learn about hacktivism and cyber terrorism and the extent of damage they cause to an organization. Learning about the current trends in hacktivism will allow them to develop ways to protect their valuable data from these attacks. Topics relating to cyberwarfare and defensive measures are taught in the following chapters.

**Module 1 Introduction to Hacktivism, cyberwarfare and cyberterrorism**

Define Hacktivism, Define Cyberwarfare, Define Cyberterrorism, Impact of hacktivism, cyberwarfare and cyberterrorism to society and business. Types of Information warfare strategies and activities, Economic Impact of Information warfare

**Module 2 Current trends in Hacktivism**

Current trends in hacktivism including wikileaks, anonymous and lulz movements, Political nature of Hacktivism, Players involved in hacktivism and discuss the recent incidents, Countermeasures to protect against such incidents. Defensive strategies for Private Companies, Surviving Offensive Ruinous and Containment

**Module 3 Nature of Cyberware**

5 types of modern warfare including cyberwarfare, Strategic nature of cyberwarfare, Computer Network Attack (CNA) and Computer Network Exploitation (CNE), How to deploy CNA and CNE assets within a strategic context in support of obtaining a kinetic goal, Review historic attacks and learn new cyber warfare models that can be used to analyze a state-sponsored attack.

**Module 4 Defensive Measures**

Defence in Depth and real life examples of how to apply it to network defense. Why information assurance of computer equipment is critical to defend the network from nefarious attacks. Use Defense tools

**Module 5 Current trends**

Current trends in Cyberwarfare and Cyberterrorism including the players and groups involved, Analyze the resent incidents of Cyberwarfare and Cyberterrorism, Case Studies.

**Text books:**

1. Cyber security – From Luxury to Necessity by Balaji Srimoolanathan, Pub: Frost & Sullivan, 2011 (Unit I,II)
2. Information Warfare and Security (Addison Wesley, 1998) Dorothy E Denning (Unit III)
3. Cyberterrorism – The Jihadi Cyber terror Threat – By Dorothy E Denning – Naval Postgraduate school, 2009 (Unit IV)
4. Information Warfare – How to survive Cyber attacks – Michael Erbschloe, Osborne/McGraw Hill, 2008 (Unit V)

**Course Name: Elective –I Designing Enterprise Networks –III**

**Course Objective:** The larger the network, the more important is its underlying design. This course focuses on the fundamentals of enterprise level networks: configuring routers and managed switches. In this course, the students will learn to identify the various components of the OSI networking model, describe the different types of networks, deploy enterprise Ethernet LANs, understand and configure an enterprise router and subdivide a network using subnets. This course covers network technologies and protocols, network planning and design methodologies. Network monitoring and management tools will also be introduced to the students. Based on the knowledge and skills, the students are to finish a design of an enterprise network to support applications such as electronic mails, centralised database access, and client-server applications

**Unit-I Cisco-Security:**Describe Firewall techniques, Cisco ASA models and features, Basic Connectivity and Device Management, deploy DHCP services, Configure Static and Dynamic Routing, configuring remote management access, AAA on Cisco Devices.

**Unit-II Implement secure network management:**ASA Access Control, Configuring the MPF, Secure Network Management, **Implement site-to-site VPNs:** Explain the different methods used in cryptography, Explain IKE protocol functionality and phases, Describe the building blocks of IPSec, Configure and verify an IPSec site-to-site VPN with pre-shared key authentication, Implement SSL VPN

**Unit-III Cisco Voice:**Understanding PSTN & VOIP, understanding RTP and RTCP, understanding Cisco Unified Communication Manager Express, understanding Cisco Unified Communication Manager, Cisco Unity connection, Cisco Unified Presence, Understanding Cisco IP Phone concepts and Registration, Managing Endpoint and End Users with CME.

**Unit-IV: Cisco Unified Communications Manager Express:** Configuring a voice network directory, call forwarding, call transfer, call park, call pickup, intercom, paging, after hours call blocking, CDR and call accounting.

**Course Name: Disaster Recovery and Business Continuity Management**

**Course Objective:**

Primarily the unit covers the importance of having a Business Continuity Planning, Disaster recovery planning for Organization and emphasizes the Standard practices proposed by the NIST SP 800-34 Emergency Action Plan for recovery.

The Unit gives a broad coverage on the different phases of BCP that consist of Project Management and Initiation, Business Impact Analysis, Recovery Strategies, Planning Development and Implementation.The Unit emphasizes the various methods of Technical Data Recovery procedures that can be immediately taken on the event of a Service Disruption and also allocating the roles and responsibilities for Various Key personnel. The Unit also gives importance to the Testing, Maintenance and Training process. A wide variety of testing process that involves full interruption, walk through, Check listing, Simulation and Parallel are explained in detail.

**Module 1: Business Continuity Management (BCP)**

Introduction to Business Continuity Planning (BCP), Business Resumption Plan (BRP) or Disaster Recovery Plan (DRP), Common terminologies used in BCP and DRP, NIST SP800-34 Emergency Action plan which includes the phases of Recover/Resume, Protect and Sustain, Causes of Disasters.

**Module 2: Stages in BCP**

BCP objectives. Information Protection Environment. Security Technology and Tools. Steps involved in creating a BCP, Phase 1: Project Management and Initiation. Phase 2: Business Impact Analysis. Phase 3: Recovery Strategies, Phase 4: Plan Development and Implementation.

**Module 3: Business Recovery strategies**

Facility and Supply Recovery strategies. User Recovery strategies. Technical Recovery strategies, Data Recovery strategies, Activation Phase- Major Disaster or Disruption, Intermediate Disaster or Disruption, Minor Disaster, Activating BC/DR Teams, Developing Triggers, Transition Trigger. Defining BC/DR Team and Key Personnel, Defining Tasks, Assigning Resources, Communication Plan.

**Module 4 Testing, Maintenance, Awareness & Training Mechanisms**

Different types of tests including structured walk-through, checklist test, simulation, parallel test and full interruption test. Steps required to maintain a BCP.

**Module 5 : Preparation of BCP**

Requirements for BCP awareness and training Visit a business organization of your choice and prepare a Business Continuity Plan for the same using the learning from this course.

**Text Book:**

1. Business Continuity and Disaster Recovery Planning – Susan Snedaker, Pub: Syngress, 2007
2. Crisis Management Mastering Skills – harvard Business School, 2004

**Reference Books:**

1. Disaster Recovery Planning: Preparing – Jon William Toigo, 3rd Edition, 2012

**Course Name: Advanced Routing Laboratory**

**List of Lab Programs**

1. Static Routing, Default Routing
2. EIGRP Routing , EIGRP Split-Horizon
3. OSPF Routing, Multi-Area OSPF Routing
4. Switching Introduction, VLANs , Trunking, VTP
5. Spanning Tree Protocol , Rapid Spanning Tree Protocol, Per VLAN Spanning Tree Protocol ,Inter-VLAN Routing
6. Standard ACL, Extended ACL , Named ACL
7. DHCP, DHCP Relay & DHCP Exclusions
8. Static Inside Source Address Translation, Dynamic NAT,Overloading an Inside Global Address
9. Frame-Relay on a Point-to-Point Interface, Frame-Relay on Multi-Point Interfaces
10. HDLC ,PPP Encapsulation, PPP PAP Authentication, PPP CHAP Authentication

**Course Name: Advanced Virtualization Laboratory**

**List of Lab Programs**

1. How to install VMware Workstation, and virtualization of physical Machine.
2. How to install Windows 7, RedHat and software upgrade in VMware Workstation.
3. How to customize you VMware Workstation to the way of your working and editing existing VM Machine by changing the configuration of virtual Machine.
4. How to install Windows Server 2008 and 2012 in VMware Workstation.
5. Installation of ESX and ESXi (ESX/ESXi 5.5/6).
6. Configuration of ESX/ESXi with ISCSi.
7. Create, configure and manage vNetwork standard Switches, Network connection.
8. Create, configure to manage port groups, storage.
9. Create and manage Vsphere Datastores.
10. Installation and configuration of vCenter Server components.
11. How to manage Multiple vCenter inventories using VMware vCenter linked mode, manage ESX/ESXi configuration compliance using Host profiles.
12. Configure and manage VMware High availability cluster, configure fault-tolerant virtual machines using Fault Tolerance.

**SEMESTER 8**

**Course Name: Employability Skills**

**Course Objective:** To be qualified for employment and to work in a corporate sector demands not only the technical knowledge and experience but interpersonal skills like speaking skills, professional etiquettes and so on. In this course, students will be taught how to develop these skills and apply them in our everyday interactions with people, both in our personal and professional lives.

**Module 1: Speaking skills**

Group Discussions; Importance of Group Discussions; Difference between Group Discussion, Panel Discussion and Debate; Format of GD as used in national level recruitment boards, Rules, ambience and normal practices, Dos and Don’ts in Group Discussions, Traits Evaluated in GDs

**Module 2: Etiquette and Mannerism 10 hours)**

Introduction; Professional etiquette – Etiquette at meetings, Dining, Involuntary Awkward Actions; Technology Etiquette – Phone, Email, Social Media, Video Conferencing, Web interview

**Module 3: Professional Presentations**

Nature of Oral Presentation; Planning a Presentation, Preparing the Presentation; Delivering the Presentation

**Reference Books:**

1. Objective English: 3 rd Edition, Edgar Thorpe and Showick Thorpe, Pearson Publishers, 2010 print.
2. Presentation skills. The essential guide for students, Patsy Mc Carthy & Caroline Hatcher, Sage publications, 2002.
3. Soft Skills – An integrated approach to Maximise Personality, Gajendra Singh Chauhan & Sangeeta Sharma, Wiley Publications

**Course: Cyber Forensics**

**Course Objective:**

Cyber Forensics deals with the development of tools and software to gather evidences from computers, without corrupting the information contained. A relatively new field, it is quickly gaining momentum as the complexities in the crimes are on the rise and it has become imperative to treat each cybercrime with diligence. Students are taught about different forms of cybercrime and its implications and duties of professionals employed at different levels towards analysing and controlling cybercrime. Methods to recover data from storage devices are covered in following chapters. Different forensic techniques and cyber laws are also dealt in detail.

**Module 1: Computer Forensics**

Introduction to Computer Forensics, Forms of Cyber Crime, First Responder Procedure- Non-technical staff, Technical Staff, Forensics Expert and Computer Investigation procedure

**Module 2: Storage Devices & Data Recover Methods**

Storage Devices- Magnetic Medium, Non-magnetic medium and Optical Medium. Working of Storage devices-Platter, Head assembly, spindle motor. Data Acquisition, Data deletion and data recovery method and techniques

**Module 3: Forensics Techniques**

Windows forensic, Linux Forensics, Mobile Forensics, Steganography, Application Password cracking-Brute force, Dictionary attack, Rainbow attack. Email Tacking – Header option of SMTP, POP3, IMAP

**Module 4: Cyber Law**

Corporate espionage, Evidence handling procedure, Chain of custody, Main features of Indian IT Act 2008 (Amendment)

**Books for References:**

1. Guide to Computer Forensics and Investigations by Nelson

**Course: Cloud Web Services**

**Course Objective:** Cloud services facilitate access to server infrastructure which is managed by the provider, which includes data storage and access, security and scalability and updates. Cloud Providers are organizations that offer these services to the clients and is the most preferred method for medium and small organizations to opt for these services in order to avoid the cost overhead and operational costs. This course aims at providing the students an insight into the operations of cloud and introduce them to different cloud providers available.

**Module 1: Introduction to Cloud Computing and Amazon Web Services**

Introduction to Cloud Computing, Cloud Service Delivery Models (IAAS, PAAS, SAAS), Cloud Deployment Models (Private, Public, Hybrid and Community), Cloud Computing Security, Case Study. Introduction to Amazon Web Services, Why Amazon? Use Cases, AWS Storage Options, AWS Compute Options, AWS Database Options, AWS Workflow Automation and Orchestration Options, AWS Systems Management and Monitoring Options, AWS Virtual Private Cloud Introduction, Pricing Concepts

**Module 2: Introduction to EC2**

Introduction To EC2, Instance Types And Uses, Autoscaling Instances, Amazon Machine Images (AMIS), Modifying Existing Images, Creating New Images Off Of Running Instances, Converting An Instance Store AMI To An EBS AMI, Instances Backed By Storage Types, Creating A Web Server Using Ec2, Elastics Block Storage (EBS), Elastic IPS, Route 53 DNS System, Cloudfront SNS Pricing

**Module 3: S3, Cloudwatch, Elastic Beanstalk and Security**

Introduction to S3, Buckets and Objects, Security, Creating A Web Server Using S3 Endpoints, Introduction To Cloudwatch, Creating Alarm Notifications, Autoscaling Instances, Deploying Scalable Application On AWS, Selecting And Launching An Application Environment, Provisioning Application Resources with Cloud formation.

Describe Amazon Dynamo, Understand key aspects of Amazon RDS, Launch an Amazon RDS instance, Identify what is Cloud Formation, Describe Amazon Cloud Watch metrics and alarms, Describe Amazon Identity and Access Management (IAM). Security in AWS, IAM (Identity and Access Management), Access Control Lists (ACLs). Securing Data at Rest and In Motion, Security Groups

**Module 4: AWS Storage, Elasticity and AWS Networking**

Amazon Storage, S3 Storage Basics, Managing Voluminous Information with EBS, Glacier Storage Service, AWS Networking: Networking Basics, VLAN Basics, Basics of AWS VLANs, AWS Network IP Addressing and Mapping

**Module 5: VIRTUAL PRIVATE CLOUD (VPC)**

Load Balancers And Availability Zones, Elastic Network Interfaces (ENI), Setting Up VPC And Internet Gateway, Setting Up a Security Group, Launching And EC2 Instance And Assigning An ENI, Setting Up A VPN, Setting Up A Customer Gateway For VPN, Setting Up Dedicated Hardware For VPC, Scenario 1:VPC With A Public Subnet Only (Standalone Web), Scenario 2: VPC with Public And Private Subnets (3 Tier App), Scenario 3:VPC With Public And Private Subnets And Hardware VPN Access (Web On The Cloud, Database and App On Prem) Scenario 4: VPC With A Private Subnet Only And Hardware VPN Access. (Extension of Your Corporate Network), Case Study

**Reference Books:**

1. Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010
2. Amazon Web Services for Dummies, Bernald Golden, John Wiley & Sons, 2013

**Text Book:**

1. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011

**Course: Advanced Network Security**

**Course Objective:** The power of computers can be witnessed when multiple computers are connected to form a network and start sharing information amongst them. But when this happens, the entire network becomes an open source and exposed to threats due to many users who log into these networks and their environments. Therefore it becomes important to learn about Network Security, in order to safeguard our networks from hackers and damages. Learning network concepts therefore becomes significant and no study of computers is complete without them.

**Module 1:Principles of Secure Network Design**

Principles of Secure Network Design- Defense in depth, Compartmentalization, Least privilege, Weakest link, Separation and rotation of duties, hierarchically trusted components and protection, Accountability and traceability

**Module 2: Security Policy**

Security Policy components - Governing policy, End-user policies, Technical policies, Security Policy - Standards, Guidelines, and Procedures, Network Security Testing Tools and Techniques

**Module 3: E-mail Security**

Securing e-mails, Architecture, PGP, MIME and S/ MIME, digital rights management (DRM)

**Module 4: Security Management**

Anti-virus and URL filtering – Anti-virus protection, URL filtering, Anti-spam and Mail – Mail Security, Configuring Anti-spam, configuring Anti-virus protection for mail, Anti-spam logging and Monitoring, Anti-spam tracking and reporting options, Securing VoIP – Control Signaling and Media Protocol, VoIP Handover, VoIP Application Intelligence, VoIP logging, Protocol Specific Security, FTP Security.

**Module 5: Content Security**

Content Security – Configuring Content Security, Advance CVP configuration, Web content protection – Web Content Security in the Rule Base, Securing XML Web Services, Understanding HTTP sessions, connections, HTTP security server performance

**Text Books**:

1. Network Security Bible by Eric Cole
2. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole

**Reference Books:**

1. Network Security Concepts and Policies. Cisco Press. 2011

**Course Name: Elective II – Application, Web Security and SDLC**

**Course Objective:** Methodical study and application of concepts is very important as it paves way to user-friendly and functional applications. Equally important is providing security features to your web applications so that information and data can be protected. These constants depend on the environment in which applications are being deployed and therefore it becomes important to learn these concepts in depth.

Software Development Life Cycle as we all know is the standard for every software developer to create applications and is a means to achieve highest output within stipulated time.

**Module 1: Phases in Software Development Life Cycle**

System Development & Management of Development, Life-Cycle Phases including Project Initiation, Functional Design analysis & Planning, System Design specifications, Software development, Installation and Implementation, Operational Maintenance and Disposal, Separation of duties in the application development lifecycle in the development, testing and Production environments

**Module 2: Introduction to Web Security and its Application**

Different environments demand different security, Environment versus Application controls, Complexity of Functionality, Data Types, formats and Length, Implementation and Default Issues, Failure states, common web security vulnerabilities, OWASP top 10 threats and counter measures

**Module 3: Features of Java and its Security**

Enterprise Java Beans, Expert Systems and Knowledge-Based Systems, Artificial Neural Networks, Object code versus Machine code, Features of Java, Java Security, Active X and Component Object Model (COM), Security issues resulting from Logic Bombs, Malware & Trojan Horses and their impact on Applications

**Module 4: Web attacks and trends**

Introduction to Web Attacks & Trends, URL Interpretation attacks, Input Validation attacks, SQL Injection attacks, Impersonation attacks & Buffer Overflow attacks, their effects and the technical & managerial controls to be put in place to address such attacks

**Module 5: Web commerce Security**

Overview of e-commerce and m-commerce; important concepts; attacks; countermeasures

**Text Books**

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole

**Course Name: Elective II – Firewall IDs and IPS**

**Course Objective:** There are many different types of devices and mechanisms within the security environment to provide a layered approach of defence so that if an attacker is able to bypass one layer, another layer stands in the way to protect the network. Two of the most popular and significant tools used to secure networks are firewalls and intrusion detection systems. The basic functionality of a firewall is to screen network traffic for the purpose of preventing unauthorized access between computer networks.

In this course, the students will examine the various types of firewalls and intrusion detection systems, as well as understand the architecture behind these technologies, identify attack indications and the countermeasures that should be applied in order to secure the network from breach. Upon completion of this course, the students will be able to describe the importance of intrusion detection and prevention, and why they must be a part of every network security administrator’s defence plan

**Module 1: Introduction**

Functions of the firewall and Intrusion Detection & Prevention Systems and configurations used. Network exploits including sniffing, spoofing, session hijacking including IP spoofing, Spoofing defenses, Denial of Service Attacks & Defenses, Packet Flood Attacks, Malformed Packet Attacks, Stack based buffer overflows & Defenses. Vulnerability Scanning methods & tools including open source & proprietary tools including nmap, batmap, batping, metasploit, aircrack-ng, airmon-ng and matriux

**Module 2: Security Policy**

Security Policy definition, Smart Dashboard, Access control for administrators, Creating the Rule Base, Implicit and explicit rules, Command-line options for the Security Policy, FireWall-1 Setup and Installation, Pre-installation Configuration, System Requirement, How to install license, Install additional firewall module, Working with the Smart Dashboard: Masking and disabling rules, Uninstalling a Security Policy, Improving VPN-1/FireWall-1 performance

**Module 3: Log Management**

Log Viewer GUI, Log Viewer Modes, Creating and Selecting Selection Criteria, Blocking Connections, Block Intruder, System Status GUI: System Status Logon, Log Viewer Modes, Creating and Selecting Selection Criteria, Blocking Connections, Block Intruder Authentication and Authentication Parameters: Understanding Authentication, How User Authentication Works, Type of Authentication, User Authentication, Client Authentication, Session Authentication, Authentication Schemes, Defining a User Template, Defining Users and Groups Network Address Translation (NAT): How NAT Works ,Type of NAT, Static NAT, Hide NAT, Address Resolution Protocol (ARP), NAT Routing, Static NAT and Anti-Spoofing, Troubleshooting NAT.

**Module 4: Honeypots and Honeynets**

Intrusion Detection and Prevention, usage of integrity checker tools & other techniques of Intrusion Detection and Prevention. Functions of Honeypots and their features, High Interaction and Low Interaction Honeypots, Honeypots and Honeynets.

**Reference Books:**

1. The official CISSP Guide for the CISSP Exam
2. www.owasp.org

**Course: Advanced Installation and Configuration of Server**

**Course Objective:** This course helps to gain the necessary and advanced information and skills needed to successfully install and configure Server, perform basic administration tasks, & manage data storage systems, Focus on configuring access to files and folders in Servers, learn the skills required to configure and manage the Hyper-V role when deploying virtual machines along with the components, technologies, and server configurations associated with virtualization, learn the skills to deploy and configure core network services, gain a better understanding about the difference between IPv4 and IPv6, and how to install DHCP and DNS, gain the knowledge and skills necessary to begin implementing Active Directory in various environments including the domain controller's role in Active Directory, and how to install it, understand what Group Policy is and how it operates by look at the different abilities of Group Policy in an Active Directory environment

**Module 1: Creating and Configuring Virtual Network in Windows**

What is Virtual Networking, how to create New Virtual Switch, configuration of MAC Addresses, how to create Virtual Network Adapters, Synthetic Adaptors and Emulated Adapters, Configuration of Hardware Acceleration Setting and Advanced Network Adapter Features, Configure Virtual Network, Extending a Production Network into Virtual Space, creating an Isolated Network

**Module 2: Configuring IPv4 and IPv6 Addressing in Windows**

IPv4 Classful Addressing, Subnetting, Classless Inter-Domain Routing with Example, Public and Private IPv4 Addressing, Using Network Address Translation and Proxy Server, IPv4 Subnetting and Supernetting, Assigning IPv4 Addressing and Configuration, Dynamic Host Configuration Protocol, Automatic Private IP Addressing(APIPA), Introducing IPv6, IPv6 Address types, Global Unicast Addresses, Link-Local Unicast Addresses, Unique Local Unicast Addresses, Special, Multicast, Anycast Addresses, Assigning IPv6 Addresses, Manual IPv6 Address Allocation, Stateless IPv6 Address Auto configuration, Dynamic Host Configuration Protocol

**Module 3: Deploying and Configuring the DHCP, DNS Service**

Understanding DHCP, DHCP Packets, DHCP message types option, pad option, option overload option, Vendor-Specific information Option, DHCP Communications and Lease Negotiation, DHCP Lease Renewal, Designing a DHCP Infrastructure, a Distributed DHCP and Centeralized DHCP Infrastructures, a Hybrid DHCP Infrastructure and DHCP Network Traffic, How to create DNS Standard, how to create DNS Domain Hierarchy, Understanding DNS Communications, Comprehending DNS Server Caching, Understanding DNS Referrals and Queries, function of DNA Forwarders and Reverse Name Resolution, Designing DNS Deployment, Resolving Internet Names, Hosting internet Domains, Hosting Active Directory Domain, Integrating DHCP and DNS, Separating DNS Services

**Module 4: Installing Domain Controllers**

Understanding Active Directory and Active Directory Architecture Functions, function of Objects and Attributes, Understanding Domains, Zooming in: Organizational Units, Zooming in: Groups, Zooming out: Domain Trees, Zooming out: Forests, Introducing LDAP, function of Replication, Installing the Active Directory Domain Services Role, Creating a New Forest, Adding a Domain Controller to an Existing Domain, Creating a New Child Domain in a Forest, Installing AD DS on Server Core, install from media(IFM), Upgrading Active Directory Domain Services, Removing a Domain Controller, configuring the Global Catalogue

**Module 5: Creating and Managing Active Directory Groups and Organizational Units**

Designing an Internal Domain Structure, how Inheritance works, how organizational Units and Group objects, Working with Organizational Units, creating OUs, using OUs to Delegate Active Directory, Management Tasks, Working with Groups, function of Group types and group scopes, Domain Local Groups, Global Groups and universal Groups, Nesting groups, Creating groups from the command line, Managing Group Memberships, Managing Group Membership using Group Policy, Managing group objects with Dsmod.exe, converting Groups, Deleting a Group

**Reference Books:**

1. Installing and Configuring Widows Server 2012 by Craig Zacker
2. Mastering Windows Server 2012 R2 by Mark Minasi, Kevin Greene, Christian Booth, Robert Butler

**Text Books:**

1. Windows Server 2012: A Handbook for Professionals by [Aditya Raj](http://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Aditya+Raj&search-alias=stripbooks) (Author)
2. MCSA 70-410 Cert Guide R2: Installing and Configuring Windows Server 2012 (Certification Guide) Hardcover – Import, 12 Sep 2014 by [Don Poulton](http://www.amazon.in/Don-Poulton/e/B001JS6IGM/ref=dp_byline_cont_book_1) (Author), [David Camardella](http://www.amazon.in/s/ref=dp_byline_sr_book_2?ie=UTF8&field-author=David+Camardella&search-alias=stripbooks) (Author)

**Course: Advanced Installation and Configuration of Server Laboratory**

**List of Lab Programs**

1. Creating and Configuring Virtual Machine Setting.
2. Creating Virtual Network.
3. Configuring Virtual Network.
4. Configuring IPv4 and IPv6 Addressing.
5. Deploying and Configuring the DHCP Service
6. Deploying and Configuring the DNS Service
7. Installing Domain Controllers
8. Creating and Managing Active Directory Groups and Organizational Units.

**Course: Cyber Forensics Laboratory**

**List of Lab Programs**

1. Physical Collection of electronic evidence using forensic standards
2. Dismantling and re-building PCs in order to access the storage media safely
3. Boot sequence and Power On Self Test mode analysis
4. Examination of File systems of Windows, Linux and Mac
5. Analysing Word processing and Graphic file format
6. Network data sniffing and analysing
7. Password and encryption techniques
8. Internet forensic and Malware analysis
9. Data recovery techniques for hard drive
10. Data recovery techniques for Pen drive and CD

**SEMESTER 9**

**Course: Professional Skills**

**Course Objective:** This course focuses on developing skill sets that help students become stronger, more confident leaders and help to understand some of the processes involved in decision making, to the psychology of decision making and the social context in which decisions are made. Topics includes Leadership & Team building, Decision Making & Negotiation , Creativity at workplace, emotional intelligence. Upon completion of this course, the students will be able to describe and discuss leadership characteristics and styles, evaluate the effectiveness of specific leadership styles in a given situation, describe how leadership impacts motivation and the workplace, have greater insight into decision-making processes, use that insight to make more effective decisions, importance of teamwork, develop emotional intelligence that will help to recognize and manage one’s emotions as well as others**.**

**Module 1: Leadership & Team Building**

Leader and Leadership; Leadership Traits; Leadership Styles; Leadership Trends; Team Building; Types of Teams;

**Module 2: Decision Making & Negotiation**

What is Decision Making; Steps for Decision Making; Decision Making Techniques; Negotiation Fundamentals; Negotiation Styles; Major Negotiation Concepts

**Module 3: Recap on Professional Skills I**

Leadership Traits; Leadership Styles; Leadership Trends; Team Building; Stages & Types

**Module 4: Creativity at Work Place**

Creativity; Motivation; Nurturing Hobbies at work; The Six Thinking Hat Method

**Module 5: Emotional Intelligence**

Meaning and Definition; Need for Emotional Intelligence; Intelligence Quotient versus Emotional Intelligence quotient; Components of EI, Skills to develop EI

**Text books:**

1. Soft Skills – An integrated approach to Maximise Personality, Gajendra Singh Chauhan & Sangeeta Sharma, Wiley Publications
2. Material prepared by the Department.

**Course: Information Technology Infrastructure Library**

**Course Objective:** ITIL-compatible tools offer better integration, interaction and compatibility with your global partners, and in addition, sticking to strict ITIL standards from a single vendor can help process integrations go seamlessly and ensure all parties are speaking the same technical language.

It is always an advantage to understand what types of ITIL tools your global partners are working with and how they rate them. ITIL frameworks provide a homogenous IT environment and eases interactions with other global companies using similar preapproved tools. Managing staff, providing services to customers and creating efficiencies for less money can be daunting tasks for any IT organization.

**Module 1: ITIL Overview and Service Strategy**

ITIL History, Components of the ITIL Library, IT Service Management, Organizing for IT Service Management, Technology and Architecture, Overview of HPSM and OTRS as service management tool, Service Strategy: Service Strategy Lifecycle Stage, Service Portfolio Management, the Demand Management Process, the IT Financial Management Process, Introduction to ISO 20000 Standards

**Module 2: Service Design**

Service Design Lifecycle Stage, The Service Catalog Management Process, The Service Level Management Process, The Availability Management Process, The Capacity Management Process, The Information Security, Management Process, The IT Service Continuity, Management Process, The Supplier Management Process

**Module 3: Service Transition**

Service Transition Lifecycle Stage, the Change Management Process, the Release and Deployment Management Process, the Service Asset and Configuration Management Process, Knowledge Management

**Module 4: Service Operation**

Service Operation Functions : Service Operation Lifecycle Stage, The Service Desk Function, The Technical Management Function, The Application Management Function, The IT Operations Management Function Service Operation Processes :The Event Management Process, The Incident Management Process, The Request Fulfilment Process, The Access Management Process, The Problem Management Process

**Module 5: Continual Service Improvement**

Continual Service Improvement principles - CSI and organizational change,Ownership, Role definitions , External and internal drivers , Service Level Management , The Deming Cycle, Service measurement ,Knowledge Management, Benchmarks , Governance ,Frameworks, models, standards and quality systemsContinual Service Improvement processes : 7step improvement process, Service reporting, Service management, return on in investment for CSI, business questions for CSI, Service level management

**Reference Books:**

1. Introduction to ITIL, Jan van Bon Stationery Office Books, The Stationery Office, 2010
2. HP operation Manual from HP, 2010
3. A Guide to Service Desk Concepts  Donna Knapp From Cengage Learning, 2010
4. The Shortcut Guide to Virtualization and Service Automation, Greg Shield Real-time Publishers, 2008
5. Service automation and dynamic provisioning techniques in IP/MPLS environments - Christian Jacquenet, Gilles Bourdon, Mohamed Boucadair  John Wiley and Sons, 2008

**Course: Elective III Exchange Server**

**Course Objective: Rationale:**

E-mail has become a very powerful today in business communication and helps people organize their work and schedule very efficiently. Exchange server is at the center of email system and understanding its working becomes very important to harness the full capabilities of e-mail systems.More advanced topics in Exchange server like virtualization, power shell and exchange management helps professionals to maintain exchange server efficiently.

**Module 1: Putting Exchange Server 2013 into context, Introducing Change in Exchange Server 2013**

**Significance of e-mail communication**

Importance of Email, Messaging Services, Exchange Server, Many modes of access, The Universal Inbox, Architecture Overview. Controlling Mailbox growth, Personal folders or PST files, Email archiving, Public Folders, Things every Email-administrators should know, Tools. **Exchange Server 2013:** Getting to know Exchange Server 2013, Exchange Server Architecture, x64 processor requirement, Windows Server 2008 R2 and Widows Server 2012 Installer, Service Pack and Patching Improvements Server roles, Edge Transport Services, Unified Messaging and Client Connectivity. The managed store, High-Availability Features Content Storage, Exchange Server Management, Improved Message and Content Control, Built-in Archiving, Message Transport Rules, Message Classifications, Rights Management, Service Message Protection Programming Interfaces, New and Improved Outlook Web App, Mobile Clients and Improved Security.

**Module 2: Understanding Availability, Recovery, Compliance, and Virtualization Server Exchange 2013**

**Technology to Business Viewpoint :**

What’s in a Name, Backup and Recovery, Disaster Recovery, Management Frameworks, A Closer Look at Availability, Storage Availability , An Overview of Exchange Storage, Direct Attached Storage, Storage Area Networks, Compliance and Governance, The Bottom Line. Virtualization Overview, Understanding Virtualized Exchange, Understanding Your Exchange Environment Effects of Virtualization, Environmental Impact, Space Impact, Complexity Impact, Additional Considerations, Virtualization Requirements, Hardware Requirements, Software Requirements, Operations, Deciding What to Virtualized, Exchange Roles ,Testing, Possible Virtualization Scenarios, Small Office/Remote or Branch Office , Site Resilience, Mobile Access

**Module 3: Introducing Power Shell, Exchange Management Shell and Getting Exchange Server Running.**

Why Use Power Shell, Understanding the Command Syntax, Verbs and Nouns, The -Identity Parameter, Camlet Parameters, Alias, Object-oriented Use of Power Shell, Filtering Output, Formatting Output, Directing Output to Other Camlets, Power Shell v3 , Remote Power Shell, Tips and Tricks, Managing Output, Running Scripts, Running Scheduled Power Shell Scripts, Debugging and Troubleshooting from Power Shell, Auto discover Concepts, What Auto discover Provides , How Auto discover Works. Hardware, Operating Systems, Configuring Windows, Understanding Server Role and Configuration, Active Directory Requirements, Installing Exchange Server 2013, GUI-based Installation, Command-line Installation, Post-installation Configuration Steps, Final Configuration.

**Module 4: Understanding Server roles, configuration, Exchange server 2013 requirement and Installation.**

Server Roles, exchange server 2013 server roles, mailbox server, client access server, possible role configurations, combined-function server, scaling exchange server 2013 roles. Selecting the right server hardware, the typical user, CPU recommendations, memory recommendations, network recommendations, disk recommendations, software recommendations, operating recommendations, windows 7/windows 8 management consoles, additional requirement, active directory requirement, installation and preparation permission.

**Module 5: Preparing for exchange 2013**

Existing exchange organization, preparing the schema, preparing the active directory forest, preparing additional domains, GUI Setup, Command-Line Setup, Command-Line installation option, Command-Line Server-recovery option, Command-Delegated server installation, installing language packs.

**Reference Books:**

1. Mastering Exchange server 2013 by David Elfassy
2. “Microsoft Exchange Server 2013 Unleashed “ By Rand Morimoto, Michael Noel, Guy Yardeni, Chris Amaris, Andrew Abbate, Technical  Edit by Ed Crowley, 2012 edition.

**Course: Elective III Principles of RIMS**

**Course Objective:** Remote infrastructure management refers to the process of remotely administering various categories in Organizational infrastructure which includes workstations, networks, storage devices and IT Security devices. Due to the benefits it offers business heads and organizational growth, like cost reduction, ease of implementation and maintenance and reduced Human resource power required, it is gaining more significance and so is studying this subject.

Students will begin with understanding the basic principles of RIM and learn about the process of global outsourcing. Further, they will learn about ways to build a RIM service set for different tasks like database operation, application support, and storage and so on. Knowledge of tools and technologies required to administer RIM is covered in the following chapters and final unit deals with overall management of RIM.

**Module 1: Introduction to RIM**

What is RIM? , Business Drivers, Components, Benefits. **Global Outsourcing:** Why Global Outsourcing? What drives outsourcing? Types of Outsourcing, Outsourcing Models, operational Aspects of Outsourcing

**Module 2: Building a RIM Service Set**

Planning for RIM Service – Customer Standpoint, Planning the Infrastructure Lifecycle, Aligning to ITIL Process, Securing Delivery Channels. **RIM Services :** Database Operations Support, Application Support, Windows Environment / Server Support, Linux Environment / Server Support, Network & IT Security Operations Support, Service Desk Operations, Release/Change Management, Application & Performance Monitoring (NOC), ETL Environment Support, Storage and Backup Support, Monitoring services, Help-desk services Data-centre management, Storage management, E-mail management, Asset management

**Module 3: RIM Tools**

Network Management Tools, Server Management Tools, Database Management Tools, Security Management Tools, Web Management Tools, Service Desk Tools

**Module 4: Managing RIM**

Operations Centre: Operations Centre Components, Functioning of an Operations Centre, The Command Centre: Functions, Design, Best Practices, Service Level Management: What is SLM?, SLM Components, SLM Benefits, SLA Framework, SLM Process, SLM Implementation, Critical Success Factors, Key Performance Indicators, Sample SLA, Skills Required for Managing RIM.

**Module 5: Improving RIMS Operational Efficiency:**

Improving Service Availability, Improving Productivity, Improving Service Efficiency, Implementing Redundancy and Fault Tolerance

**Reference Books:**

1. IT Infrastructure and Its Management, 2st Edition - Phalguni Gupta, Umarani Jayaraman, Surya Prakash - Tata Mcgraw Hill Education,2010

**Course: Elective IV: ISO 27001, PCIDSS and HIPAA**

**Course Objective:** The training of lead auditors normally includes a classroom and exam portion and a requirement to have performed a number of ISO/ 27001 audits. The main ISO/27001 Provisional ISMS Auditor, SMS Auditor/Internal Auditor, Lead ISMS Auditor**,** PCI DSS Requirements, HIPAA.

**Module 1: ISO 27001: Auditing:** Principles of auditing, Conducting and Managing an Audit Program. **Auditing Activities:** Scoping andPre audit Survey, Planning and preparation, Fieldwork, Analysis, Reporting, Closure, **Competence and evaluationof auditors:** Auditor competence, **Information Security Management System Audit Testing:** Information securitymanagement system, Management responsibility, Internal ISMS audits, Management review of the ISMS, ISMS improvement.

**Module 2: Information security audit check listing:** Security Policy, Organizing information security, Asset management, Human resources security, Physical and environmental security, Communications and operations management, Access control, Information systems acquisition, development and maintenance, Information security incident management, Business continuity management, Compliance

**Module 3: PCI DSS:** Scope of PCI DSS Requirements, Best Practices for Implementing PCI DSS into Business-as-Usual Processes, PCI DSS Assessment Process, **PCI DSS Requirements**: Build and Maintain a Secure Network and Systems, Protect Cardholder Data, Maintain a Vulnerability Management Program, Implement Strong Access Control Measures , Regularly Monitor and Test Networks ,Maintain an Information Security Policy

**Module 4: HIPAA – Purpose and Scope** HIPAA Security Rule, Security Rule Goals and Objective, Security Rule Organization, **Administrative Safeguards:** Security Management Process, Assigned Security Responsibility, Workforce Security, Information Access Management, Security Awareness and Training, Security Incident Procedures, Contingency Plan, Evaluation, Business Associate Contracts and Other Arrangements.

**Module 5: Physical and Technical safeguards**

**Physical Safeguards:** Facility Access Controls, Workstation Use, Workstation Security, Device and Media Controls, **Technical Safeguards:** Access Control, Audit Controls, Integrity, Person or Entity Authentication, TransmissionSecurity**, Organizational Requirements:** Business Associate Contracts or Other Arrangements, Requirements for Group Health Plans.

**TEXT BOOK:**

1. Information Security Policy Development for Compliance: ISO/IEC 27001, NIST SP 800-53, HIPAA Standard, PCI DSS V2.0, and AUP V5.0, Barry L. Williams,2013

**Course: Elective IV : Datacenter Architecture**

**Course Objective:**

The data center is home to the computational power, storage, and applications necessary to support an enterprise business. The data center infrastructure is central to the IT architecture, from which all content is sourced or passes through. Proper planning of the data center infrastructure design is critical, and performance and scalability need to be carefully considered. The course provides fundamental knowledge about datacenter, deals with building integrated data center information infrastructures, including facility, hardware, software, and network components as solutions to particular enterprise information management needs and requirements. Students will learn critical elements of modern data center design including network infrastructure; data storage technologies**.**

**Module 1: Data Center Design Principles**

The Service Delivery Network, A Route to Standardized Operating Environments, Dynamic Infrastructure ,The Service Delivery Network: A Case Study, Data Center Virtualization, Energy Efficiency Strategies: Server Virtualization Technology, Understanding and Deploying Logical Domains  Operating System Virtualization Product Architecture

Server Platforms in Data Center: Servers used in Data Center, Server Management Storage used in Data Center: Storage System, iScsi Multipathing, Network Management and Fabric Management.

**Module 2: Disaster Recovery fundamentals**

Disaster Architecting Availability and Disaster Recovery Solutions, Security: Managing Data Center Security, Management of Data Center: Remote Monitoring, Applications: Web Proxy, LDAP

**Module 3: Solution Overview**

Product Features and options, Key EVA values and Virtualization technology, drive enclosures, Functional and physical layout of the EVA, solution Low/Middle/High End configurations, Capacity matrix, interconnects and indicators, Controller software versions and upgrades, Command view EVA installation and operation, Storage Management Server (SMS), Controllers: Controller features and redundancy, Operator Control Panel (OCP) operations, Configuring the World Wide Name and checksum on the arrays, Password installation for the OCP, Enclosure host and port identification. Disk Drive Enclosures: Drive enclosure models and configurations, Customer self-repair operations for the drive enclosure, Drive enclosure indicators and connections from front and rear views, EMU functions, LED status displays and display and pushbutton operations, Enclosure Address Bus EAB and Environmental Monitoring Unit EMU functions. Storage Works Command View EVA: Command View EVA overview, EVA Management Server requirements, Browsing to the SMS (versions 3x and 5x), Installation and configuration of Command, View EVA versions 6.x - 8.x, Licensing of the various versions of command View, Firmware and management software for the EVA 4400

**Module 4: Basic Concepts and Terminology**

Virtual storage overview, Powering the Storage System off and on sequence, Storage system, Disk group configurations, default disk group and metadata content, Distributed virtual RAID (VRAID) technology, Hosts and Virtual disk overview.

**Module 5: Storage System Configuration**

Configuration guidelines, controller code loads and upgrades, Gathering preliminary host information and configuration of host connections, Perform an un-initialize of the storage system, Perform storage discovery and initialization, Disk group creation and configuration guidelines. Host System Configuration: Operating system support, Co-existence with other EVA models, Installing and configuring hosts, Host properties, Presenting Storage (LUN mask/map), Verifying LUN presentation. Storage Works Multi-Path Solutions: Automatic Path Failover and Load Balancing, Supported multi-path solutions, Active-Active Failover: Overview of active-passive and active-active failover modes, Virtual disk ownership and transitions, Configuration Best Practices Summary.

**Text Books:**

1. Data center fundamentals by Mauricio Arregoces, Maurizio Portolani From Cisco Press, 2010
2. Storage Management: The Complete Cornerstone Guide to Storage Management Best Practices - Gerard Blokdijk, Ivanka Menken, Emereo Pty Ltd (October 3, 2010), 2011

**Reference Books:**

1. The holy grail of network storage management By Jon William Toigo, Prentice Hall; 1 edition (November 6, 2003)
2. NX-OS And Cisco Nexus Switching: Next-Generation Data Center Architectures Kevin Corbin, Ron Fuller, David Jansen          Cisco Press, 2009
3. The Green and Virtual Data Center Greg Schulz Auerbach  Publications, 2008
4. Handbook of data center management Layne C. Bradley A1Books.co.in, 2008
5. Administering Data Centers: Servers, Storage, And Voice Over Ip By KailashJayaswal               Wiley-India, 2010

**Course: Cloud Computing Solutions**

**Course Objective:**

Windows Azure is a cloud computing platform and infrastructure, for building, deploying and managing applications and services through a global network of Microsoft-managed data centers.

**Module 1: Introduction**

Introduction to  MS. Azure, **Virtual Machines:** Creating Virtual Machines, Difference Between Basic and Standard VMs,Logging in to a VM and Working, Attaching an empty Hard Disk to VM, Hosting a Website in VM , Configuring End Points, Scaling up and Down, Creating a custom Image from VM,Creating a VM from a custom Image, Shut down VM without Getting Billed,VM Pricing

**Module 2:   Managing Infrastructure in Azure**

**Managing Infrastructure in Azure:** Azure Virtual Networks, Highly Available Azure Virtual Machines ,Virtual Machine Configuration Management, Customizing Azure Virtual Machine Networking. **Load Balancing:** Creating Cloud Services, Adding Virtual Machines to a Cluster, Configuring Load Balancer.

**Module 3: Windows Azure**

**Azure Storage:** What is a Storage Account,Advantages, Tables, blobs, queues and drives, Azure Appfabric: Connectivity and Access control **Automation:**Introduction Windows Power Shell ,Creation of Runbooks, Uploading a Shell Script, Authoring a Shell Script

**Module 4: SQL Azure**

**SQL Azure:** Creating a SQL Server, Creating a SQL DB, Creating Tables, Adding Data to the Tables, View Connection Strings, Security Configurations, Migrating on premise DB to SQL Azure.

**Module 5: Websites**

**Websites:** Creating a Website, Setting deployment credentials, Choosing a platform, Setting up Default page for website, Scaling ,Auto Scaling by Time, Auto Scaling by Metric, Difference between Free, Shared, Basic and Standard websites, Creating a website using Visual studio

**Text Books:**

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

**Reference Books:**

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg,  Andrzej  M. Goscinski, Wiley, 2011
2. Windows Azure Step By step by Roberto Brunetti.

**Course: Business Organization Basics**

**Course Objective:** This course introduces students to the world of business and the practice of management. It is designed to provide the student a basic understanding of organizations, managers, business, and themselves. Students will learn to see and analyze an organization as a complete and integrated system. It will cover the dynamic world of business, the nature of managerial work, planning and decision making, organization structure and design, individual responsibility. Upon successful completion of this course the students will be able to describe the key elements of the business organization, provide a critical perspective on the main functional areas of management, build a foundation of knowledge on the different theoretical approaches to management and decision making, develop analytical skills to identify the links between the functional areas in management, organizations, management practices and the business environment

**Module 1: Introduction**

Management Definition, Concepts of Management, Management and Administration, Functions of Manager in the Information age, Science, theory and practice of Management - Managerial objectives and Role, Management Thoughts Evolution, Business Environment, Attitudes beliefs and Values of Society, Social Responsibilities of Business

**Module 2: Management Functions**

Introduction to Unit, Planning, Nature and importance, Planning Steps, Organizing and its process, Staffing, Systems & Approach, Directing; Controlling and its process, Decision Making

**Module 3: Motivation**

Introduction to Unit , Meaning & need for motivation, Motivation Theories, Leadership – Meaning and styles, group and team working, HRM

**Module 4: Functional Areas**

Introduction to Unit , Marketing - Market and Environment, Consumer / buyer behavior, marketing mix, Advertisement and sales Promotion, Financial Management – Introduction to Book keeping and financial statements, Break Even analysis

**Module 5: Upcoming Trends in Management**

Introduction to Unit , Production and Productivity, Production Planning and Control, TQM, Globalization and WTO, Business process reengineering, IT in Management, Outsourcing

**Reference Books:**

1. Business Organization by R K Singh, VK Publications

**Course: Cloud Computing Solutions - Lab**

**List of Lab Programs**

1. Create and document the process of creating a windows azure account
2. Create a virtual machine from the gallery of windows server 2008 R2
3. Create a virtual machine using the option “quick Create”
4. Create a custom VM and Capture the image
5. Create a vm from a captured image
6. Add a VMs to a cluster and deploy load balancer on the same
7. Create and publish / host a webpage in windows azure
8. Create a website using Visual studio
9. Create a SQL server DB , Create tables and add data to the table
10. Test basic sql commands on the table created in the previous step.
11. Migrate an on premise DB to Azure
12. Create a storage account in Azure

**Course: Mini Project**

**Details of the project will be provided later**

**SEMESTER 10**

**Course: Major Project / Internship**

Details will be provided later