**Assam Down Town University**

**Course Matrix-(UG Program)**

**BCA (Dual Specialisation -Cloud Technology and Information Security)**

**BCA (Bachelor of Computer Applications)**

**Specialization in Cloud Technology and Information Security**

**(3 Years / 6 Semesters)**

**Scheme of Study**

**BCA- Semester I**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Name of subject** | **Hrs/week**  **L-T-P** | **Credits** | **UE** | **IA** | **Total** |
| BCA101 | Communication Skills | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA102 | Fundamentals of Mathematics | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA103 | Interactive Web Application Development | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA104 | Computer fundamentals & organization | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA105 | Programming in c | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA106 | Introduction to Linux | 4-0-0 | 04 | 60 | 40 | 100 |
| **Learning Labs** | | | | | | |
| BCA115 | C PROGRAMMING LAB | 0-0-2 | 01 | CA -50 | | 50 |
| BCA116 | Linux Lab | 0-0-2 | 01 | CA -50 | | 50 |
|  | **Total** | 28 | 26 |  | | **700** |

Credits-26

**BCA- Semester II**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Name of subject** | **Hrs/week**  **L-T-P** | **Credits** | **UE** | **IA** | **Total** |
| BCA201 | Reasoning and Thinking | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA202 | Fundamentals of Storage Management | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA203 | Operating system Building Blocks | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA204 | Object Oriented Programming with C++ | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA205 | Data structures using c | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA206 | Desktop Operating System | 3-0-3 | 04 | 60 | 40 | 100 |
| **Learning labs** | | | | | | |
| BCA214 | Object Oriented Programming with C++ Lab | 0-0-2 | 01 | CA -50 | | 50 |
| BCA215 | Data structures lab | 0-0-2 | 01 | CA -50 | | 50 |
|  | **Total** | 30 | 26 |  | | **700** |

Cumulative Credits-26+26=52 **BCA- Semester III**

**BCA- Semester III**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Name of subject** | **Hrs/week**  **L-T-P** | **Credits** | **UE** | | **IA** | **Total** |
| BCA301 | Information security fundamentals | 4-0-0 | 04 | 60 | | 40 | 100 |
| BCA302 | Software engineering | 4-0-0 | 04 | 60 | | 40 | 100 |
| BCA303 | RDBMS | 4-0-0 | 04 | 60 | | 40 | 100 |
| BCA304 | Fundamentals of Computer networks | 4-0-0 | 04 | 60 | | 40 | 100 |
| BCA305 | PROGRAMMING in JAVA | 4-0-0 | 04 | 60 | | 40 | 100 |
| BCA306 | Routing | 3-0-2 | 04 | 60 | 40 | | 100 |
| **Learning labs** | | | | | | | |
| BCA313 | RDBMS lab | 0-0-2 | 01 | CA -50 | | | 50 |
| BCA315 | Java programming lab | 0-0-2 | 01 | CA -50 | | | 50 |
|  | **Total** | 29 | 26 |  | | | **700** |

Cumulative Credits-26+26+26=78

**BCA- Semester IV**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Name of subject** | **Hrs/week**  **L-T-P** | **Credits** | **UE** | **IA** | **Total** |
| **Core Papers** | | | | | | |
| BCA401 | Installation and Configuration of Server | 4-0-0 | 04 | 60 | 40 | 100 |
| **Specialization -1 Information Security Management Services** | | | | | | |
| BCA402 | Ethical Hacking Fundamentals | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA403 | Cryptography Fundamentals | 4-0-0 | 04 | 60 | 40 | 100 |
| **Specialization - 2 Cloud Technology** | | | | | | |
| BCA404 | Introduction to Cloud Technology | 4-1-0 | 05 | 60 | 40 | 100 |
| BCA405 | Fundamentals of Datacenter | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA406 | OSI Layer Protocols | 4-0-0 | 04 | 60 | 40 | 100 |
| **Learning Labs** | | | | | | |
| BCA412 | Ethical Hacking - Lab | 0-0-2 | 01 | CA -50 | | 50 |
| BCA411 | Installation and Configuration of Server- Lab | 0-0-2 | 01 | CA -50 | | 50 |
|  | **Total** | 29 | 27 |  | | 600 |
|  | | | | | | |
|  |  |  |  |  |  |  |

Cumulative Credits-26+26+26+27=105

**BCA-Semester V**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Name of subject** | **Hrs/week**  **L-T-P** | **Credits** | **UE** | **IA** | **Total** |
| **Specialization -1 Information Security Management Services** | | | | | | |
| BCA501 | Cyber Forensics and Investigation | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA502 | Virtualization and Cloud Security | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA503 | IT Governance, Risk, & Information Security Management | 4-0-0 | 04 | 60 | 40 | 100 |
| **Specialization - 2 Cloud Technology** | | | | | | |
| BCA504 | Linux Administration | 4-0-0 | 04 | 60 | 40 | 100 |
| BCA505 | Fundamentals of IT Infrastructure Library | 4-1-0 | 05 | 60 | 40 | 100 |
| BCA 506 | Principles of Virtualization | 4-0-0 | 04 | 60 | 40 | 100 |
| **Learning Labs** | | | | | | |
| BCA511 | Cyber Forensics and Investigation - lab | 0-0-2 | 01 | CA -50 | | 50 |
| BCA514 | Linux Administration – Lab | 0-0-2 | 01 | CA -50 | | 50 |
|  | **Total** | 29 | 27 |  | | 700 |

Cumulative Credits-26+26+26+27+27=132

**BCA-Semester VI**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Name of subject** | **Hrs/week**  **L-T-P** | **Credits** | **UE** | | **IA** | **Total** |
| **Specialization -1 Information Security Management Services** | | | | | | | |
| BCA601 | Mobile, Wireless and VOIP Security | 4-0-0 | 04 | 60 | | 40 | 100 |
| **Specialization - 2 Cloud Technology** | | | | | | | |
| BCA602 | Introduction to Windows Azure | 4-0-0 | 04 | 60 | | 40 | 100 |
|  | **Total** | 08 | 08 |  |  | | 400 |

**Project work:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Subject Code** | **Title of the project** | **Hrs/week** | **Credits** | **IA** | **UE**  **Dissertation + Viva** | **Total** |
| BCA621 | Project and Viva-Voce | 24 | 16 | 100 | 150 + 50 | 300 |

Cumulative Credits-26+26+26+27+27+24=156

**Total credits = 156**

**Total Marks = 4000**

**Course: Communication Skills**

**Course Objective:** 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

**Module2 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.

**Module3: 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.

**Module4:  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.

**Module5:   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: 4012.
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., 4006.
3. M.Ashraf Rizvi, “Effective Technical Communication”,TatamcGraw-Hill Publishing Company Limited, New Delhi.4009.

**Reference Books:**

1. Sumant. S, ‘Technical English’, Second Edition, McGraw-Hill Education (India) Pvt. Ltd., 4008.
2. Dr. M. Hariprasad,” Communicative English “Third Edition, Neelkamal Publications, PVT. LTD.,4007.
3. SangeetaSharma ,Binod Mishra, ‘Communication Skills for Engineers and Scientists, PHI Learning Private Limited., New Delhi, 4009.

**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

**Interactive Web Application Development**

**Course Objective:**

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 Scripting Languages**

Scripting Languages and WWW, Types of Scripting Languages – server-side scripting and client-side scripting, Glue Language, Characteristics of Scripting Languages, Shell Script, PHP, Perl, Python, R, Ruby, JavaScript, Smalltalk, -VBScript, etc, Front-end and back-end web development, Advantages and Disadvantages of Scripting Languages

**Module 2: Introduction to JavaScript**

Data types, variables, operators, expressions, statements, functions, objects, arrays, date, math, error handling, flow control, loops

**Module 3: JavaScript Object Model**

Regular expression, JavaScript object model, Standard Document Object Model - creating nodes, namespace, DOM and HTML, DOM and CSS, Event handling, Event types

**Module 4: Windows, Frames and Overlay in JavaScript**

Window object, dialogs, Controlling windows, form handling, form fields, form validation. UI elements, browser management, media management

**Module 5: AJAX and JSON**

Introduction to AJAX: XMLHttp, AJAX request and response, Events, Database; Introduction to JSON: Syntax, Http, Files; Sessions, templates, relational databases, Object Relational Mapping

**Reference Books:**

1. The World of Scripting Languages, by David Barron, Wiley India Pvt Ltd.
2. JavaScript: The Complete Reference, 4013 by [Thomas Powell](http://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Thomas+Powell&search-alias=stripbooks), [Fritz Schneider](http://www.amazon.in/s/ref=dp_byline_sr_book_2?ie=UTF8&field-author=Fritz+Schneider&search-alias=stripbooks)
3. Introduction to JavaScript Object Notation: A To The Point Guide to JSON, by Linsay Bassett, O’Reilly
4. Ajax Black Book, Dreamtech Press
5. Scripting Languages: Perl, Python, Mumps, JavaScript, Php, Ruby, VBscript, Awk, Command. Com, Sed, Bash, Autolisp, Tcl, Shell Script, Quakec, Books, LLC.

**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 (4000) “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: 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, mallocvscalloc, 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 YashwantKanetka, 6th Edition, PBP Publication
2. The C programming Language by Richie and Kenninghan, 4004, BPB Publication

Programming in ANSI C by Balaguruswamy, 3rd Edition, 4005, Tata McGraw Hill

**Course: Introduction to Linux**

**Course Objective:** The course provides an overview of the Linux Operating System, geared toward new users as an exploration tour and getting started guide. This unit provides examples to help the learners get a better understanding of the Linux system. The unit also provides the guidelines for the learners to take up vendor certifications. The unit explores the basics of Linux, the underlying management of the Linux operating system and its network configuration. The complete system services of Linux is explained along with the troubleshooting

**Unit 1: Linux 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) . Creating and viewing files using cat, file comparisons, View files, disk related commands, checking disk free spaces.

**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.

**Unit 2 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.

**Unit 3 : UNIX Process Management**

The Structure of Processes: Process States and Transitions - Layout of system memory -

Context of a process. Process Control: Process Creation – Signals – Process Termination – Invoking other programs – PID & PPID – Shell on a Shell.

**Unit 4: VI editor**

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. Communicating with Other Users: who, mail, wall, send, mesg, ftp.

**Unit 5: System administration**

Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of user’s accounts, creating and mounting file system, checking and monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command

**Text Books:**

1. The Design of Unix Operating System, Maurice J. Bach, Pearson Education, 4010
2. Advance UNIX, a Programmer’s Guide, S. Prata, BPB Publications, and New Delhi, 4011
3. Unix Concepts and Applications, Sumitabh Das, 4010
4. The UNIX Programming Environment, B.W. Kernighan & R. Pike, Prentice Hall of India. 4009
5. Guide to UNIX Using LINUX, Jack Dent Tony Gaddis, Vikas/ Thomson Pub. House Pvt. Ltd. 4010

**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: Linux Laboratory**

**List of Programs**

1. Execute 25 basic commands of UNIX.

2. Basics of functionality and modes of VI Editor.

3. WAP that accepts user name and reports if user is logged in.

4. WAP which displays the following menu and executes the option selected by user:

1. ls 2. Pwd 3. ls –l 4. ps –fe

5. WAP to print 10 9 8 7 6 5 4 3 2 1 .

6. WAP that replaces all “\*.txt” file names with “\*.txt.old” in the current.

7. WAP that echoes itself to stdout, but backwards.

8. WAP that takes a filename as input and checks if it is executable, if not make it executable.

9. WAP to take string as command line argument and reverse it.

10. 1. Create a data file called employee in the format given below:

a. EmpCode Character

b. EmpName Character

c. Grade Character

d. Years of experience Numeric

e. Basic Pay Numeric

$vi employee

A001 ARJUN E1 01 14000.00

A006 Anand E1 01 12450.00

A010 Rajesh E2 03 14500.00

A002 Mohan E2 02 13000.00

A005 John E2 01 14500.00

A009 Denial SmithE2 04 17500.00

A004 Williams E1 01 14000.00

Perform the following functions on the file:

a. Sort the file on EmpCode.

b.Sort the file on

(i) Decreasing order of basic pay

(ii) Increasing order of years of experience.

c. Display the number of employees whose details are included in the file.

d. Display all records with ‘smith’ a part of employee name.

e. Display all records with EmpName starting with ‘B’.

f. Display the records on Employees whose grade is E2 and have work experience of 2 to 5 years.

g.Store in ‘file 1’ the names of all employees whose basic pay is between 10000 and 15000.

h.Display records of all employees who are not in grade E2

**SEMESTER 2**

**Course: Reasoning and Thinking**

**Course Objective: 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. 4007
2. Bajpai, N. Business Statistics, Pearson, 4010
3. Sharma J.K., Business Statistics, Pearson Education India, 4010.
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: Fundamental of 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, 4003

**Reference Book:**

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley; 1 edition (April 6, 4009)

**Course: Operating System- Building blocks**

**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,6thEdition,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),40(Except 40.8, 40.9), 22,23)

Nutt: Operating Systems, 3/e Pearson Education 4004

**Course: Object oriented programming 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 YeshwanthKanetkar

**Course: Data Structures using C**

**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, 4001
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, 400
8. Kamthane: Introduction to Data Structures in C. Pearson Education 4005.
9. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 4006
10. Langsam, AusensteinMaoshe& M. Tanenbaum Aaron Data Structures using C and C++ Pearson Education

**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, 4009

**Reference Books:**

1. Operating Systems Fundamentals D. Irtegov, 4005

2. A Short Introduction to Operating Systems (M. Burgess), 4010

3. Operating Systems: Design and Implementation (Second Edition)., Andrew S. Tanenbaum, 4010

**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: Information Security Fundamentals**

**Objectives:** This course enables the students to understand the concepts of IT security, Threats, Vulnerabilities, Impact and control measures. And also to get familiarized with Asset management along with the objective to create awareness in Digital Rights management.

**Module 1: Introduction to Information Security**

Definition of Information Security, Evolution of Information Security; Basics Principles of Information Security; Critical Concepts of Information Security; Components of the Information System; Balancing Information Security and Access; Implementing IT Security, The system Development Life cycle, Security professional in the organization.

**Module 2: The Need for IT Security**

Business Needs-Protecting the functionality, Enabling the safe operations, Protecting the data, safe guarding the technology assets; Threats-compromises to Intellectual property, deliberate software attacks, Espionage and trespass, sabotage and vandalism; Attacks-Malicious Codes, Back Doors, Denial of Service and Distributed Denial of Service, Spoofing, sniffing, Spam, Social Engineering.

**Module 3: Risk Management**

Definition of risk management, risk identification, and risk control, Identifying and Accessing Risk, Assessing risk based on probability of occurrence and likely impact, the fundamental aspects of documenting risk via the process of risk assessment, the various risk mitigation strategy options, the categories that can be used to classify controls.

**Module 4: Network Infrastructure Security and Connectivity**

Understanding Infrastructure Security- Device Based Security, Media-Based Security, Monitoring and Diagnosing; Monitoring Network- Firewall, Intrusion Detection System, Intrusion Prevention system; OS and Network Hardening, Application Hardening; Physical and Network Security- Policies, Standards and Guidelines.

**Books for References:**

1. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 4012
2. Operating System Concepts, 8th Edition by Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Pub: John Wiley & sons, Inc., 4009.
3. Information security: Principles and Practice - Mark Stamp, 2nd Edition, Pub: John Wiley & Sons, Inc., 4011

**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, 4007
2. Roger S. Pressman, “Software Engineering – A practitioner’s Approach”, Sixth Edition, McGraw-Hill International Edition, 4005

**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, 4006
2. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addision Wesley, 4007.
3. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 4003.

**Course: Fundamentals of 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. YouluZheng and Shakil Akhtar, Networks for Computer Scientist and Engineers, Oxford University Press,4006
2. James F. Kurose and Keith W. Ross, Computer Networking – A Top-Down Approach Featuring the Internet,2/e Pearson Education ,4003

**Reference Books:**

1. S. Keshav, An Engineering Approach to Computer Networking, Pearson education ,4002
2. Halsall, Data Communication, Computer Networks and Open Systems, Addison Wesley, 1996
3. Andrew S. Tanenbaum, Computer Networks , 4/e, Pearson education, 4003
4. Behrouz A. Fourouzan ,Data Communications and Networking, 2/e Tat McGrawhill,4000
5. Leon-Garcia and I. Widjaja, Communication Networks, Tata McGraw Hill, 4000
6. Bertsekas and Gallagar , Data Networks, 2/e, PHI, 1992
7. Douglas E Comer ,Computer Networks and Internet’s, 2/e Pearson Education,4004
8. Gallo, Computer Communication and Networking Technologies, Thomson Learning

**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: 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, AnalyzingClassfull 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, 4011

**Text Books:**

1. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 4013
2. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 4008
3. CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 4010

**Course: RDBMS Lab**

**List of experiments**

1. Create User in Oracle Database and grant and revoke the privileges and use of commit savepointroleback 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

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: 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 4012:-** Edition, Supporting Server Role, Supporting Server Virtualization, Server Licensing. **Installing Windows Server 4012:** 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 4012: 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 4012 (Certification Guide) Hardcover – Import, 12 Sep 4014 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 4012 by Craig Zacker
2. Mastering Windows Server 4012 R2 by Mark Minasi, Kevin Greene, Christian Booth, Robert Butler

**Ethical Hacking Fundamentals**

**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**

Hacking Methodology, Process of Malicious Hacking, Footprinting and Scanning: Footprinting, Scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs White Box Techniques

**Module 2: Hacking Methodology**

Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques

**Module 3: Web and Network Hacking**

SQL Injection, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls

**Module 4: Report writing & 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

**Books for References:**

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

**Course: Cryptography Fundamentals**

**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 Name: Introduction to Cloud Technology**

**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, 4010
2. Handbook on Cloud Computing, BorivojeFurht, Armando Escalante, Springer, 4010

**Text Book:**

1. Cloud Computing: Principles and Paradigms, RajkumarBuyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 4011

**Course: Fundamentals of Datacenter**

**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, 4006
2. Information Storage and Management, G. Somasundaram – Alok Srivastava, Wiley; 1 edition (April 6, 4009)
3. Administering Data-Centers, KailashJayswal, Wiley; 1 edition (November 28, 4005)

**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),theTunneling 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: 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

**Course: Installation and Configuration of Server- Lab**

**List of experiments:**

1. Installation of Windows Server 4012
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