
# School of Applied Sciences

# Centurion University of Technology & Management

# B.Sc. in Information Technology (Specialization in Cloud Technology and Information Security)

## (Three years program)

## 2017

Course Structure

| SEMESTER-I | | | | |
|---|---|---|---|---|
| Sl No | Subject Code | Subject Name | Subject Type (T+T+P) | Credits |
| 1 | BCTI 1101 | Environmental Science | 2+0+0 | 2 |
| 2 | BCTI 1102 | Problem Solving technique and programming in C | 4+0+0 | 4 |
| 3 | BCTI 1103 | Problem Solving technique and programming in C Lab | 0+0+3 | 2 |
| 4 | BCTI 1104 | Information Security Fundamental | 4+0+0 | 4 |
| 5 | BCTI 1105 | Information Security Fundamental Lab | 0+0+3 | 2 |
| 6 | BCTI 1106 | Operating System | 4+0+3 | 6 |
| Total | | | | 20 |

| **SEMESTER-II** | | | | |
|---|---|---|---|---|
| **Sl No** | **Subject Code** | **Subject Name** | **Subject Type (T+T+P)** | **Credits** |
| 1 | BCTI 1201 | Introduction to communication science | 2+0+0 | 2 |
| 2 | BCTI 1202 | Database Management System | 4+0+3 | 6 |
| 3 | BCTI 1203 | Object Oriented Programming with C++ | 4+0+3 | 6 |
| 4 | BCTI 1204 | Network Security Basics | 4+0+3 | 6 |
| **Total** | | | | **20** |

| SEMESTER-III | | | | |
|---|---|---|---|---|
| **Sl No** | **Subject Code** | **Subject Name** | **Subject Type (T+T+P)** | **Credits** |
| 1 | BCTI 2301 | Cryptography Fundamentals | 4+2+0 | 6 |
| 2 | BCTI 2302 | Principles of Virtualization | 4+0+3 | 6 |
| 3 | BCTI 2303 | Introduction to Cloud Technology | 4+0+3 | 6 |
| 4 | BCTI 2304 | IT Governance Risk and Information Security Management | 2+0+0 | 2 |
| 5 | **Inter Disciplinary Subjects** | **Generic Elective – 1** | | **6** |
| **Total** | | | | **26** |

| SEMESTER-IV | | | | |
|---|---|---|---|---|
| **Sl No** | **Subject Code** | **Subject Name** | **Subject Type (T+T+P)** | **Credits** |
| 1 | BCTI 2401 | Introduction to Linux | 4+0+3 | 6 |
| 2 | BCTI 2403 | Designing enterprise network | 4+0+3 | 6 |
| 3 | BCTI 2404 | Ethical hacking Fundamentals | 4+0+3 | 6 |
| 4 | BCTI 2405 | Disaster recovery and Business continuity management | 2+0+0 | 2 |
| 5 | **Inter Disciplinary Subjects** | **Generic Elective -2** | | **6** |
| **Total** | | | | **26** |

| SEMESTER-V | | | | |
|---|---|---|---|---|
| **Sl No.** | **Subject Code** | **Subject Name** | **Subject Type (T+T+P)** | **Credits** |
| 1 | BCTI 3502 | Installation and configuration of Server | 4+0+3 | 6 |
| 2 | BCTI2408 | Fundamentals of Storage and Data center | 4+0+0 | 4 |
| 3 | BCTI3506 | Virtualization and Cloud Security | 4+0+0 | 4 |
| 4 | BCTI2307 | Introduction to Web Technology | 4+0+3 | 6 |
| 5 | BCTI3605 | Information Technology and Infrastructure Library | 3+0+0 | 3 |
| 6 | BCTI3507 | Logical Reasoning & Thinking | 2+0+0 | 2 |
| 7 | BCTI3508 | Life Skills Development(LSD) - IV | 0+0+3 | 2 |
| | | Total | | **27** |

| SEMESTER-VI | | | | |
|---|---|---|---|---|
| **Sl. No.** | **Subject Code** | **Subject Name** | **Subject Type (T+T+P)** | **Credits** |
| 1 | BCTI3505 | Python Programming | 4+0+3 | 6 |
| 2 | DECD0601 | Cloud Technology | | 30 |
| | | Total | | 36 |

## SEMESTER -I

## ENVIRONMENTAL SCIENCE CREDIT 2 (2-0-0)

**MODULE-I: (12Lectures)**

**Introduction to Environmental Studies and Natural Resources:** Definition, scope and importance, Need for public awareness, Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer/pesticide problems, water logging, salinity, case studies, Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies on -**Water resources**: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dam's-benefits and problems. **Land resources:** Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources.

**Ecosystem and Biodiversity:** Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession ,Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) ,Introduction to biodiversity – definition: genetic, species and ecosystem diversity, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values ,Biodiversity at global, national and local levels – India as a mega-diversity nation ,Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Conservation of biodiversity

**MODULE- II:(12 Lectures)**

**Environmental Pollution**: Definition, Causes, effects and control measures of: (a) air pollution (b) water pollution (c) soil pollution (d) marine pollution (e) noise pollution (f) thermal pollution (g) nuclear hazards, Solid waste management: causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution

**Social Issues and the Environment:** From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns, case studies, Environmental ethics: issues and possible solutions ,Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents/holocaust, case studies, Wasteland reclamation ,Consumerism and waste products.

**MODULE- III :( 12Lectures)**

**Human Population and the Environment:** Population growth, variation among nations, Population explosion- family welfare program, Environment and human health

**Text Books:**


1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", PHI Learning education Pvt., Ltd., second edition, ISBN 81-297-0277-0, 2004.
2. Miller T.G. jr., "Environmental Science", Wadsworth publishing co.
3. Townsend C., Harper J and Michael Begon, "Essentials of Ecology", Blackwell science.
4. Trivedi R.K. and P.K. Goel, "Introduction to air pollution", techno-science publications.


**Reference Books:**


1. Bharuchaerach, "The Biodiversity of India", Mapin publishing Pvt. Ltd., Ahmedabad India.
2. Trivedi R.K., "Handbook of Environmental Laws", Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro media.
3. Cunningham, W.P.Cooper, T.H.Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
4. Wager K.D., "Environmental Management", W.B. Saunders Co., Philadelphia, USA, 1998.

## PROBLEM SOLVING TECHNIQUE AND PROGRAMMING IN C CREDIT 4 (4-0-0)

**MODULE- I:** **(20 Lectures)**

**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

**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- II:** **(20 Lectures)**

**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 .

**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- III:** **(12 Lectures)**

**Additional features (12L):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 functionsTEST

**Text Books:**

1. Let us C by YashwantKanetka, 6th Edition, PBP Publication

**Reference Books:**

1. The C programming Language by Richie and Kenninghan, 2004, BPB Publication
2. Programming in ANSI C by Balaguruswamy, 3rd Edition, 2005, Tata McGraw Hill

**PROBLEM SOLVING TECHNIQUE AND PROGRAMMING IN C LAB CREDIT**

**2(0-0-3)**

**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.

## INFORMATION SECURITY FUNDAMENTALS CREDIT 4(4-0-0)

**MODULE- I: (20Lectures)**

**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.
**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- II: (15 Lectures)**

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

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

**MODULE- III: (10 Lectures)**

**RISK ASSESSMENT AND CYBER LAWS (12L)**

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

**Text Book:**

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

## INFORMATION SECURITY FUNDAMENTALS LAB CREDIT 2(0-0-3)

**List of Programs:**

1. System Security Configuration in Windows 7
2. Password based Authentication process
3. Hashes and message digests calculation using has calculators
4. Service Management of Windows 7 for prevention of attacks
5. Password cracking using Brute force, Dictionary and Rainbow attack
6. Hiding information using Steganography tools
7. Event logger analysis
8. Windows Registry analysis

## OPERATING SYSTEMS CREDIT 4(4-0-0)

**MODULE- I:** **(20 Lectures)**

**Introduction:** System Software, Resource Abstraction, OS strategies, Types of operating systems - Multiprogramming, Batch, Time Sharing, Single user and Multiuser, Process Control & Real Time Systems. **Operating System Organization:** Factors in operating system design, basic OS functions, implementation consideration; process modes, methods of requesting system services – system calls and system programs.

**MODULE- II:** **(12 Lectures)**

**Process Management** : System view of the process and resources, initiating the OS, process address space, process abstraction, resource abstraction, process hierarchy, Thread model Scheduling: Scheduling Mechanisms, Strategy selection, non-pre-emptive and pre-emptive strategies.

**MODULE- III:** **(15 Lectures)**

**Memory Management:** Mapping address space to memory space, memory allocation strategies, fixed partition, variable partition, paging, virtual memory,Shell introduction and Shell Scripting-

1. What is shell and various type of shell, Various editors present in linux
2. Different modes of operation in vi editor
3. What is shell script, Writing and executing the shell script
4. Shell variable (user defined and system variables)
5. System calls, Using system calls
6. Pipes and Filters
7. Decision making in Shell Scripts (If else, switch), Loops in shell
8. Functions
9. Utility programs (cut, paste, join, tr , uniq utilities)
10. Pattern matching utility (grep)

**Text Books**:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.

**Reference Books:**


1. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
2. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
3. W. Stallings, Operating Systems, Internals & Design Principles , 5th Edition, Prentice Hall of India. 2008.
4. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

## OPERATING SYSTEMS LAB CREDIT 2 (0-0-3)

**List of Programs:**

Note: Following exercises can be performed using Linux or Unix

1. Usage of following commands:

ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.

2. Usage of following commands:

cal, cat(append), cat(concatenate), mv, cp, man, date.

3. Usage of following commands: chmod, grep, tput (clear, highlight), bc.
4. Write a shell script to check if the number entered at the command line is prime or not.
5. Write a shell script to modify "cal" command to display calendars of the specified months.
6. Write a shell script to modify "cal" command to display calendars of the specified range of months.
7. Write a shell script to accept a login name. If not a valid login name display message – "Entered login name is invalid".
8. Write a shell script to display date in the mm/dd/yy format.
9. Write a shell script to display on the screen sorted output of "who" command along with the total number of users .
10. Write a shell script to display the multiplication table any number,
11. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.
12. Write a shell script to find the sum of digits of a given number.
13. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.
14. Write a shell script to find the LCD(least common divisor) of two numbers.
15. Write a shell script to perform the tasks of basic calculator.
16. Write a shell script to find the power of a given number.
17. Write a shell script to find the factorial of a given number.
18. Write a shell script to check whether the number is Armstrong or not.
19. Write a shell script to check whether the file have all the permissions or not.
20. Program to show the pyramid of special character "*".

## SEMESTER - II

## INTRODUCTION TO COMMUNICATION SCIENCE CREDIT 2 (2-0-0)

**MODULE- I:** **(10 Lectures)**

**Communication in Business:** Role of Communication in Business - Main forms of Communication in Business - Communication process - Coding and decoding - Roots of misunderstanding - Inferential model - Original message and reconstructed message - Symbols mismatch implications -Non-verbal symbols - Verbal symbols - Seven communication roadblocks - Communicating across cultures.

**MODULE- II:** **(10 Lectures)**

**Managerial Writing :**7cs of written communication, Business letters - Stationery - Format and layout -E-mail - Managing the mailbox - Presenting mail – Commonsense and etiquette. Report Writing - Parts of a report - Qualities of a good report - Improving writing skills, Internal communication through memos, minutes, notices & reports.

**MODULE- III:** **(10 Lectures)**

**Sample Business Letters :**Types of Business letters - routine letters, bad news and persuading letters, sales letters, Inquiries, Circulars, Quotations, Orders, Acknowledgments, Executions, Complaints, Claims & Adjustments, collection letters, job application letters, Curriculum Vitae / Resume - Invitation to interview - Offer of employment - Letter of acceptance -Letter of resignation - Recommendation letter, Logical Traps

**Text Books:**

1. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill.

**Reference Books:**

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

## DATABASE MANAGEMENT SYSTEMS CREDIT4 (4-0-0)

**MODULE- I: (10 Lectures)**

**Introduction to Database Management Systems**: Characteristics of database approach, data models, DBMS architecture and data independence.

**MODULE- II: (15 Lectures)**

**Entity Relationship and Enhanced ER Modeling:** Entity types, relationships, SQL-99:Schema Definition , constraints, and object modeling.

**MODULE- III: (15 Lectures)**

**Relational Data Model:** Basic concepts, relational constraints, relational algebra, SQL queries.

**Database design:** ER and EER to relational mapping, functional dependencies, normal forms up to third normal form.

**Text Books:**

**1.** R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.

**Reference Books :**

1. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
2. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
3. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education,2013.

## DATABASE MANAGEMENT SYSTEMS LABS CREDIT 2 (0-0-3)

**List of Programs:**

**Note: My Access/MySQL may be used.**

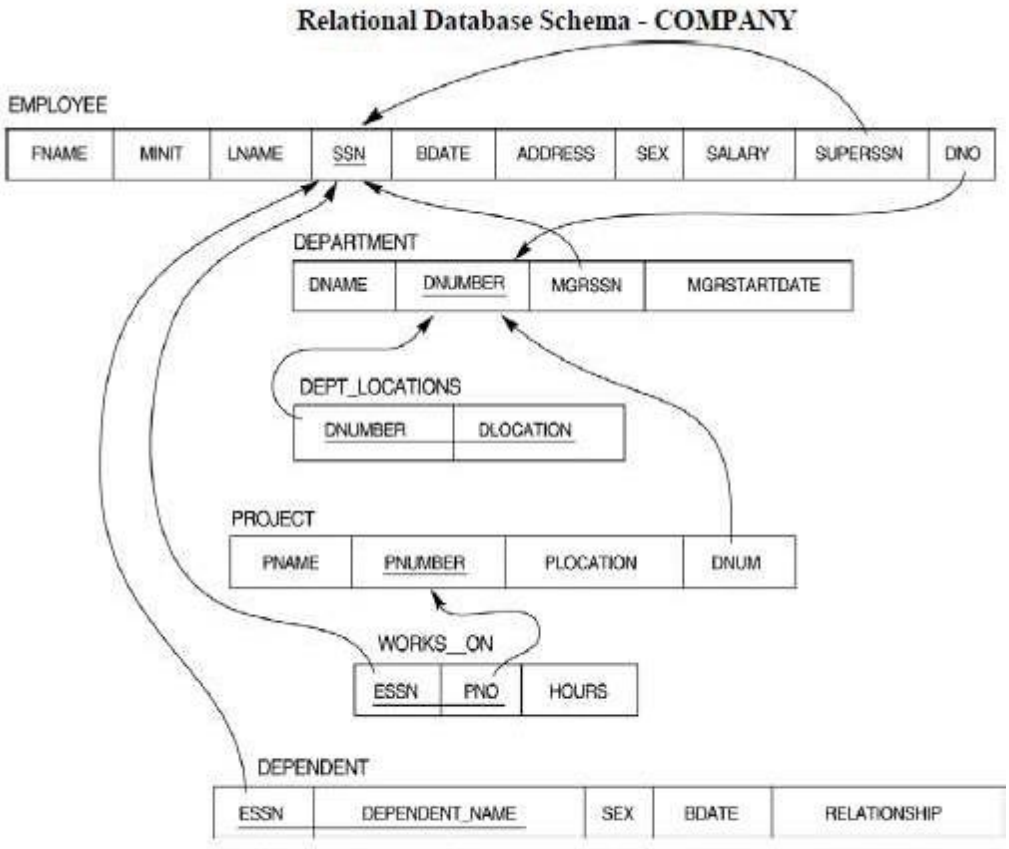
The following concepts must be introduced to the students:

**1. DDL Commands**

- Create table, alter table, drop table

## 2. DML Commands

- Select , update, delete, insert statements
- Condition specification using Boolean and comparison operators (and, or, not,=,<>,>,<,>=,<=)
- Arithmetic operators and aggregate functions(Count, sum, avg, Min, Max)
- Multiple table queries (join on different and same tables)
- Nested select statements
- Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
- Categorization using group by……..having
- Arranging using order by




**Questions to be performed on above schema**

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**3.** Perform the entire Query using the above Schema:

1. Create tables with relevant foreign key constraints
2. Populate the tables with data
3. Perform the following queries on the database :
4. Display all the details of all employees working in the company.
5. Display ssn, lname, fname, address of employees who work in department no 7.
6. Retrieve the birth date and address of the employee whose name is 'Franklin T. Wong'
7. Retrieve the name and salary of every employee
8. Retrieve all distinct salary values
9. Retrieve all employee names whose address is in ‘Bellaire’ 10.Retrieve all employees who were born during the 1950s

11.Retrieve all employees in department 5 whose salary is between
50,000 and 12.60,000(inclusive)

13. Retrieve the names of all employees who do not have supervisors

14. Retrieve SSN and department name for all employees

15. Retrieve the name and address of all employees who work for the 'Research' department

16. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.

17. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor. 18.Retrieve all combinations of Employee Name and Department Name

19. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.

20. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.

21. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.

22. Select the names of employees whose salary does not match with salary of any employee in department 10. 23.Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.

24. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.

25. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.

26. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.

27. Select the names of employees whose salary is greater than the average salary of all employees in department 10.

28. For each department, retrieve the department number, the number of employees in the department, and their average salary.

29. For each project, retrieve the project number, the project name, and the number of employees who work on that project.

30. Change the location and controlling department number for all projects having more than 5 employees to ‘Bellaire’ and 6 respectively.

31. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.

32. Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary insertion in the Department table.

33. Delete all dependents of employee whose ssn is ‘123456789’.

34. Delete an employee from Employee table with ssn = ‘12345’( make sure that this employee has some dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set to NULL

35. Perform a query using alter command to drop/add field and a constraint in Employee table.

## OBJECT ORIENTED PROGRAMMING WITH C++ CREDIT4 (4-0-0)

**MODULE- I:** **(12 Lectures)**

**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- II:** **(20 Lectures)**

**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.

**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- III: (20 Lectures)**

**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.

**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.

**Text Book:**

1. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill. Publications

**References Books:**

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

## OOPS WITH C++ LAB CREDIT 2 (0-0-3)

**List of Programs:**

**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**

9. Using different methods to write programs to implement function overloading with default arguments for the following problems :
   a) To find whether a given number is prime.
   b) To find the factorial of a number
10. 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.
11. Create a class to hold information of a husband and another for the wife. Using friend functions give the total salary of the family.
12. Write a program to overload the following operators (any 3)
    a) Binary operator '+' to concatenate 2 strings
    b) Relational operator '<' to find whether one data is less than the other.
    c) Unary operator '++' to find the next date of a given date.

13. 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.

14. 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.

15. Using operator overloading concept implement arithmetic manipulation on two complex numbers.

## NETWORK SECURITY BASICS CREDIT 4(4-0-0)

**MODULE- I: (10 Lectures)**

**Introduction To Network Security:** Introduction of Unit , Perimeter Security ,Overview of Network Security , Access Control ,Device Security, Security features on Switches , Firewall, Types of firewall, Attack vector and Mitigation techniques, Access Management - Securing Management Access, Multifactor Authentication, Layer 2 Access Control, Wireless LAN (WLAN) Security and Network Admission Control (NAC).

**MODULE- II: (20 Lectures)**

**Threats, Vulnerabilities And Attacks** :Introduction of Unit, Threat, Vulnerabilities – vulnerability assessment and vulnerability scanning, 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 – Network Administrative Principles and Securing Network Application.

**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- III: (15 Lectures)**

**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.

**Network Management**: Security Monitoring and correlation, Security Management - Security and Policy Management and Security Framework and Regulatory Compliance, Best Practices Framework, Case Studies, C

**Text Books:**

1. Security + Guide to Network Security Fundamentals Mark Ciampa CourseTechnology, Cengage Learning

**Reference Books**

1. CCIE Professional Development Series Network Security Technologies and Solutions Yusuf Bhaiji CCIE No. 9305, CISCO Press.

2. Network Security with Open SSL Pravir Chandra, Matt Messier, John Viega O'Reilly

## NETWORK SECURITY BASICS LABS CREDIT 2(0-0-3)

**List of Experiment:**

1. Firewall Configuration - I
2. Firewall Configuration - II
3. VPN Configuration - I
4. VPN Configuration - II
5. IDS Configuration - I
6. IDS Configuration - II
7. IDS Configuration - III
8. Router Security - I
9. Router Security - II
10. Router Security - III
11. Traffic Monitoring using WireShark - I
12. Traffic Monitoring using WireShark - II

## SEMESTER - III

## CRYPTOGRAPHY

## FUNDAMENTALS CREDIT 6(4-2-0)

**MODULE- I:** **(15 Lectures)**

**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- II:** **(20 Lectures)**

**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

**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- III:** **(15 Lectures)**

**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

**Text Books:**

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

**Reference Books:**

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

## PRINCIPLES OF VIRTUALIZATION CREDIT 4 (4-0-0)

**MODULE- I:** **(15 Lectures)**

**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- II:** **(20 Lectures)**

**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

**Deploying and Managing 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- III:** **(20 Lectures)**

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

**Understanding Virtualization Software:** List of virtualization Software available .Vmware-introduction to Vsphere, ESXi, VCenterServer andVsphere 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

**Text Book:**

1. Virtualization with Microsoft Virtual Server 2005 by TwanGrotenhuis, RogierDittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam, Syngress Publications, 2006

**Reference Books:**

1. Virtualization--the complete cornerstone guide to virtualization best practices, Ivanka Menken, Gerard Blokdijk, Lightning Source Incorporated, 2008.

2. Virtualization: From the Desktop to the Enterprise, Chris Wolf, Erick M. Halter, EBook, 2005

## PRINCIPLES OF VIRTUALIZATION LAB CREDIT 2 (0-0-3)

**List of Programs:**

1. Installing VMware ESXi server.
2. Accessing ESXi through vSphere Client and Uploading ISO Images of OS into the Datastore of ESXi Server.
3. Creating Virtual machines in the ESXi Server
4. Monitoring the performance of ESXi Server.
5. Preparing Domain for vCenter Server as prerequisite.
6. Installing vCenter Server
7. Creating Datacenter and adding ESXi Server as Host to vCenter Server.
8. Cloning a Virtual Machine and Creating a Virtual Machine from cloned VM Template.
9. Configuring vNetwork Distributed Switch using vCenter Server.
10. Assigning permissions to users on Datacenter.

## INTRODUCTION TO CLOUD TECHNOLOGY CREDIT 4(4-0-0)

**MODULE- I:** **(12 Lectures)**

**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- II:** **(20 Lectures)**

**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

**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- III:** **(15 Lectures)**

**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.

**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..

**Text Books:**

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

**Reference Books:**

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

## INTRODUCTION TO CLOUD TECHNOLOGY LAB CREDIT 2(0-0-3)

**List of Programs:**

1. Study the basic cloud architecture and represent it using a case study
2. Enlist Major difference between SAAS PAAS & Iaas also submit a research done on various companies in cloud business and the corresponding services provided by them , tag them under SAAS , Paas & Iaas.
3. Study and present a report on Jolly cloud.
4. Present a report on obstacles and vulnerabilities in cloud computing on generic level
5. Present a report on Amazon cloud services.
6. Present a report on Microsoft cloud services.
7. Present a report on cost management on cloud
8. Enlist and explain legal issues involved in the cloud with the lelp of a case study
9. Explain the process of migrating to cloud with a case study.
10. Present a report on google cloud and cloud services.

**IT GOVERNANCE, RISK, & INFORMATION SECURITY MANAGEMENT CREDIT**

**2(2-0-0)**

**MODULE- I: (16 Lectures)**

**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 **Information Systems Strategy: Role** of Strategic Planning for IT, Role of Steering committee, Policies and Procedures.

**MODULE- II: (14 Lectures)**

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

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

**Text Books:**

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

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## SEMESTER - IV

## INTRODUCTION TO LINUX CREDIT 4(4-0-0)

**MODULE- I: (20Lectures)**

**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.

**MODULE- II: (20 Lectures)**

**The UNIX File System:** nodes - 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.

**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.

**MODULE- III: (15 Lectures)**

**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.

**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 unnamed, 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, 2010
2. Advance UNIX, a Programmer's Guide, S. Prata, BPB Publications, and New Delhi, 2011


**Reference Books:**


1. Unix Concepts and Applications, Sumitabh Das, 2010
2. The UNIX Programming Environment, B.W. Kernighan & R. Pike, Prentice Hall of India. 2009
3. Guide to UNIX Using LINUX, Jack Dent Tony Gaddis, Vikas/ Thomson Pub. House Pvt. Ltd. 2010


## INTRODUCTION TO LINUX CREDIT LAB CREDIT 2(0-0-3)

**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 –
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 | 12000.00 |
| 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 | 12000.00 |

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

## DESIGNING ENTERPRISE NETWORK CREDIT 4(4-0-0)

**MODULE- I: (16 Lectures)**

**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

**Ethernet LANs and Switches:** Building Ethernet LANs with Switches, Cisco LAN Switches, Configuring Ethernet Switching.

**MODULE- II: (20 Lectures)**

**IP Version 4 Addressing and Sub netting :** 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

**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- III: (10 Lectures)**

**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.

**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


**Reference Books:**


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

## DESIGNING ENTERPRISE NETWORK LAB CREDIT 2(0-0-3)

**List of Programs:**

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

## ETHICAL HACKING FUNDAMENTALS CREDIT 4(4-0-0)

**MODULE- I:** **(20 Lectures)**

**Introduction to Ethical Hacking:** Hacking Methodology, Process of malicious hacking. **Foot printing and Scanning:** Foot printing, scanning. **Enumeration:** Enumeration. **System hacking and Trojans:** System hacking, Trojans and Black Box Vs White Box Techniques.

**Attacking 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- II:** **(10 Lectures)**

**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- III:** **(10 Lectures)**

**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

**Text Book:**

1. Hacking Exposed 7th Edition, by Stuart McClure, Joel Scambray, George Kurtz – McGraw hill-2010

**Reference Books:**

1. Basic of hacking and Penetration – Patrick Engerbrestson 2010.
2. Certified Ethical Hacker All-in-One – Matt Walker 2011

## ETHICAL HACKING FUNDAMENTALS LAB CREDIT 2(0-0-3)

**List of Programs:**

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

**DISASTER RECOVERY AND BUSINESS CONTINUITY MANAGEMENT CREDIT 2(2-0-0)**

**MODULE-I: (8 Lectures)**

**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.

**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-II: (8 Lectures)**

**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.

**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- III: (10 Lectures)**

**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 Books:**


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

## FIFTH SEMESTER

## INSTALLATION AND CONFIGURATION OF SERVER CREDIT 4(4-0-0)

**MODULE- I: (12 Lectures)**

**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- II: (20 Lectures)**

**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.

**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- III:** **(20 Lectures)**

**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.

**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.

**Text Books:**


1. Windows Server 2012: A Handbook for Professionals by Aditya Raj (Author)
2. MCSA 70-410 Cert Guide R2: Installing and Configuring Windows Server 2012 (Certification Guide) Hardcover – Import, 12 Sep 2014 by Don Poulton (Author), David Camardella (Author)


**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.

## INSTALLATION AND CONFIGURATION OF SERVER LAB CREDIT 2(0-0-3)

**List of Programs:**

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

## Fundamentals of Storage and Data Center

Module -1 9 Hrs

**Introduction to Storage System**

Introduction to Information Storage: Information Storage, Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing Data Center Environment: Application, Database Management System (DBMS), Host (Compute), Connectivity, Storage, Host Access to Data, Direct-Attached Storage, Storage Design Based on Application Data Protection (RAID): RAID Implementation Methods, RAID Array Components, RAID Techniques, RAID Levels, RAID Impact on Disk Performance, RAID Comparison.

**Module -2 9 Hrs**

**Storage Networking Technologies**

Network-Attached Storage: General-Purpose Servers versus NAS Devices, Benefits of NAS, File Systems and Network File Sharing, Components of NAS, NAS I/O Operation, NAS Implementations, NAS File-Sharing Protocols, Factors Affecting NAS Performance , File-Level Virtualization. Fibre Channel Storage Area Networks: Fibre Channel Overview,The SAN and Its Evolution, Components of FC SAN, FC Connectivity, Switched Fabric Ports, Fibre Channel Architecture, Fabric Services, Switched Fabric Login Types, Zoning, FC SAN Topologies, Virtualization in SAN.IP SAN and FCoE: iSCSI, FCIP, FCoE

**Module – 3 9 Hrs**

**Backup and Disaster Recovery**

Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Life Cycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions.

Backup and Archive: Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Architecture, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Targets, Data Deduplication for Backup, Backup in Virtualized Environments, Data Archive, Archiving Solution Architecture.

**Module-4** **9 Hrs**

**Data Center Consolidation**

Reasons for Data Center Consolidation: Reasons for Data Center Consolidation, Consolidation Opportunities,

Data Center Consolidation Phases: Phase 1: Study and Document the Current Environment, Phase 2: Architect the Target Consolidated Environment, Phase 3: Implement the New Architecture, Phase 4: Control and Administer the Consolidated. Best Practices in IT: Defining Best Practices, Deploying Best Practices, Benefits of Best Practices, Systems Management Best Practices, Server Cluster Best Practices, Data Storage Best Practices, Network Management Best Practices, Documentation Best Practices, Network Diagram Documentation, Documentation Formats

**Module-5** **9 Hrs**

**Data Center Clusters**:

Cluster Architecture: Asymmetric Two-Node Clusters, Symmetric Two-Node Clusters, Complex Cluster Configurations, Failover Policies, Best Practices.Cluster Requirements: Required Hardware Cluster Components, Cluster Software Requirements, What Happens During Service Failover, Cluster Installation Checklist.Designing Cluster-Friendly Applications: Automating Operations, Controlling Application Failover Time, Reducing Data Loss During Failover, Minimizing Application Failures, Designing Node-Independent Applications, Minimizing Planned Downtime, Restoring Client Connections.

**Text Books:**

1. Information Storage and Management (Storing Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments) 2nd Edition by Somasundaram Gnanasundaram Alok Shrivastava
2. Administering Data Centers: Servers, Storage, and Voice over IP By Kailash Jayaswal

**Reference Books:**

1. Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, ISCSI, INFINIB and FOCE by Ulf Troppens (Author)
2. Storage Management in Data Centers: Understanding, Exploiting, Tuning, and Troubleshooting Veritas Storage Foundation by Volker Herminghaus and Albrecht Scriba
3. Blade Servers and Virtualization: Transforming Enterprise Computing While Cutting Costs by Barb Goldworm and Anne Skamarock

## VIRTUALIZATION AND CLOUD SECURITY CREDIT 4(4-0-0)

**MODULE- I: (12 Lectures)**

**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- II: (20 Lectures)**

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

**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- III: (12 Lectures)**

**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

**Text Books:**

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

## INTRODUCTION TO WEB TECHNOLOGY 4(4-0-0)

**Module I** **(15 Lectures)**

**Introduction to Web**

What is Web?, What is WWW, Web site - Static and Dynamic web site, Web application - Client-server, Web development Technologies- Html, CSS, Js , XML, Servlet & JSP, PHP and Ajax

**Html**

Introduction to Html, Html 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

**Module II** **(20 Lectures)**

**CSS**

Introduction to CSS, Syntax, Selectors, Embedding CSS to Html, Formatting fonts, Text & background color, Borders & boxing

**JavaScript**

Introduction to JS, Embedding JS into Html, Variables, Data types, Operators, Conditional statements, Looping statements, Strings, Arrays, Math Object, Date Object, Functions, Objects, Event Handling.

**Module III** **(12 Lectures)**

**XML**

Introduction to XML, Difference b/w Html & XML, XML editors, XML Elements & Attributes XML DTD, XML Schema, XML DOM

## IINTRODUCTION TO WEB TECHNOLOGY LAB CREDIT 2(0-0-3)

**List of Experiments**

1. Design a simple web page with head, body and footer, with heading tags, image tag
2. Design a web site for book information, home page should contain books list, when particular book is clicked, information of the books should display in the next page.
3. Design a page to display the product information such as name, brand, price and etc with table tag
4. Design a web site for book information using frames, home page should contain two parts, left part should contain books list, and right part should contain book information.
5. Design a web page to capture the user information such as name, gender, mobile number, mail id, city, state, and country using form elements.
6. Design a web page with nice formatting like background image, text colors and border for text using external CSS.
7. Design a web page to perform mathematical calculations such as addition, subtraction, multiplication, and division
8. Design a web page to read data from an XML file and display the data in tabular format, take the data as employee information.
9. Design a web site for online purchase using CSS, JS and XML, web site should contain the following web pages.

   Home page

   Login page

   Signup page

   Product details page

**Text/Reference Books**


1. HTML, XHTML & CSS Bible, Brian Pfaffenberger, Steven M.Schafer, Charles White, Bill Karow- Wiley Publishing Inc, 2010
2. HTML Black Book by Steven Holzner
3. Web Design with HTML, CSS, JavaScript and jQuery Set by Jon Duckett
4. Beginning Java Script with DOM scripting and Ajax By Christian Heilmann- Apress Publisher, 2010

## INFORMTION TECHNOLOGY INFRASTRUCTURE LIBRARY CREDIT 3(3-0-0)

**MODULE- I:** **(9 Lectures)**

**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 – II:** **(9 Lectures)**

**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-III:** **(9 Lectures)**

**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-IV:** **(9 Lectures)**

**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- V:** **(9 Lectures)**

**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 systems Continual Service Improvement processes : 7step improvement process, Service reporting, Service management, return on in investment for CSI, business questions for CSI, Service level management

**Text Book:**

1. Introduction to ITIL, Jan van Bon Stationery Office Books, The Stationery Office, 2010

**Reference Books:**

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

## LOGICAL REASONING & THINKING CREDIT 2 (2-0-0)

**Module – I: Verbal ability** (03 hours)

Synonyms, Antonyms and One word substitutes

**Module - II: Basic quantitative aptitude** (7 hours)

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 - III: Logical Reasoning** - I (8 hours)

Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism, Blood Relations; concept of a statistical population and sample from a population; qualitative and quantitative data

**Module - IV: Measures of Central Tendency** (8 hours)

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 - V: Presentation of Data** (8 hours)

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

**Life Skills Development (LSD) - IV (0-0-3)**

**List of Experiments:**

**LAB-1:**

What is a GD?

- Types of GD
- Essentials of a GD
- Skills assessed during GD.

**LAB-2:**

- GD practice session (at least twice)
- Doubt clearing sessions on GD
- Practice sessions on GD
- Structure of a GD

**LAB-3:**

- Format of GD
- GD as used in national level recruitment boards
- Differences between a GD and a debate.

**LAB-4:**

- Resume format
- Current trends in resume writing
- How to write professional resumes
- Essentials of resume writing
- Difference between a CV and a Resume

**LAB-5:**

- Cover letters
- Working on Cover letter/ email
- Being in sync with the current format

**LAB-6:**

- Types of interview
- One to one, many to one, telephonic, appraisal, placement, discipline, exit
- Interview handling skills
- Effective way of handling interview questions

**LAB-7:**

- Mock interview practice sessions (at least twice),
- Doubt clearing on Interview skills
- Practice sessions on Interview skills

**LAB-8:**

- Grooming
- Kinesics, paralanguage and proxemics in interviews
- Frequently asked questions during interviews

**LAB-9:**

- Presentation Skills – Language Skills
- Practicing how to be professional and formal in approach
- Formal language to be used during presentation

**LAB-10:**

- Body language and Grooming
- Practising impromptu presentations
- Extempore and debates

**LAB-11:**

- Presentation Skills – Overall impact
- Effective strategies of oral presentations
- Audience analysis
- Use of media
- Voice modulation
- Presentation planning
- Delivery and appearance research
- Power point presentations
- Making technical talk interesting

## SEMESTER VI

## Python Programming 6(4-0-0)

**Module – 1:**

**Introduction to Python** **(9 hrs)**

**Introduction:** Introduction to Python, Setting up the environment, Installing Python, Running python program, Python's execution model, Guidelines on how to write good, The Python culture, A note on the IDEs

**Built-in Data Types:** Numbers, Immutable sequences, Mutable sequences, Set types, Mapping types – dictionaries, The collections module, Final considerations

**Iterating and Making Decisions:** Conditional programming, Looping, Putting this all together.

**Module – 2:**

**Advanced Concepts** **(9 hrs)**

Functions, the Building Blocks of Code: Use of functions, Scopes and name resolution, Input parameters, Return values, Recursive functions, Anonymous functions, Function attributes, Built-in functions, Importing objects.Saving Time and Memory: map, zip, and filter, Comprehensions, Generators, Some performance considerations, Name localization, and Generation behavior in built-ins.

Advanced Concepts – OOP, Decorators, and Iterators: Decorators, Class and object namespaces, Attribute shadowing, Initializing an instance, Accessing a base class, Multiple inheritance, Static and class methods, Private methods and name mangling, The property decorator, Operator overloading, Polymorphism

**Module – 3:**

**Web Development** **(9 hrs)**

The Edges – GUIs and Scripts: Scripting-The imports, Parsing Arguments, The business logic, GUI application- The import, The layout logic, The business logic, The tkinter.tix module,The turtle module, wxPython, PyQt, and PyGTK, The principle of least astonishment, Threading considerations.

Web Development Done Right: Django design philosophy, The Django URL dispatcher, Setting up Django, Adding the Entry model, Customizing the admin panel, Creating the form, Writing the views, Tying up URLs and views, Writing the templates, Writing a Flask view, Building a JSON quote server in Falcon.

**Module – 4:**

**Cloud Native Python** **(9 hrs)**

Building Microservices in Python: Modeling microservices, Building microservices, Testing the RESTful API.

Building a Web Application in Python: Getting started with applications, Working with Observables and AJAX, Binding data for the adduser template, Working on Observables with AJAX for the addtweet template, Data binding for the addtweet template, CORS - Cross-Origin Resource Sharing, Session management, Cookies.

Interacting Data Services: MongoDB terminology, Initializing the MongoDB database, Integrating microservices with MongoDB, Working with user resources, Working with the tweets resources.

**Module – 5:** **(9 hrs)**

**Exception Handling**

Testing, Profiling, and Dealing with Exceptions: The anatomy of a test, Testing guidelines, Unit testing, Test-driven development, Exceptions, Profiling Python.

Debugging and Troubleshooting: Debugging with print, Debugging with a custom function, Inspecting the traceback, Using the Python debugger, Inspecting log files, Other techniques, Troubleshooting guidelines.

**Text Books**:


1. Learn Python Programming, 2nd Edition by Fabrizio Romano
2. Python Cookbook, 3rd Edition by David Beazley (Author), Brian K. Jones (Author)

**Reference Books:**


**1.** Python Programming: A Step-by-Step Guide For Absolute Beginners by Brian Jenkins and ATS Coding Academy

2. Python and AWS Cookbook: Managing Your Cloud with Python and Boto by Mitch Garnaat

3. Advanced Python Programming: Build high performance, concurrent, and multi-threaded apps with Python using proven design patterns by Dr. Gabriele Lanaro

**4.** Programming Google App Engine with Python: Build and Run Scalable Python Apps on Google's Infrastructure by Dan Sanderson


## PYTHON PROGRAMMING LAB 2(0-0-3)

List of Experiments:

1. Write a python code to find given number is prime or not
2. Write a python code to find LCM and GCM of a given list
3. Write a python code to find mean and standard deviation of a given list of numbers
4. Write a python code to add and delete element from a dictionary using functions
5. Write a python code to print 10 student details using class and lists
6. Write a python code to find student from a given list using class
7. Write a python code to inherit employee class to student class
8. Write a python code to build simple GUI calculator
9. Write a python code to build web page with student registration form
10. Write a python code to build web pages with sign-in and sing-up forms
11. Write a python code to build Rest api for product
12. Write a python code to build Ajax enabled web application for product

**Cloud Technology**

| Course Title | Code | Type of course | Credits | Prerequisite |
|---|---|---|---|---|
| Cloud Technology | DECD0601 | Theory + Practice + Project | 30 | Virtualization and Basic Cloud Concept |

**Course Objective**

- Understanding fundamentals of Cloud and its basic infrastructure
- Explain the core concepts of the Amazon Web Services paradigm
- Learn about account management, billing and pricing
- Acquire knowledge on security model and compliance concepts

**Learning Outcome**

- Explain AWS cloud values and Implement different policies using its services
- Analyze and manage billing and pricing used for the resources
- Demonstrating proficiency in deploying, and comparing and contrasting Cloud-based storage systems

**Evaluation Systems**

| **Internal Examination** | **Component** | **% of Marks** | **Method of Assessment** |
|---|---|---|---|
| | Internal Theory | 40 (30+5+5) | Written examination + Assignment + Attendance |
| | Internal Practice | 50 (40+10) | Lab Work |
| | Internal Project | 50 | Project Work |
| **External Examination** | External Theory | 60 | Written examination |
| | External Practice | 50 | Lab Work |
| | External Project | 50 | Project Work + Report |
| **Total** | | **300** | |

## Course Outline

**Module: I** **(12 Hours)**

**Introduction to Cloud Computing Platform**

Introduction to Cloud Computing, Types of Cloud, Cloud Computing Models, Architecture of Cloud Environments, On-Demand & Self Service - Characteristics of Cloud, Characteristic of CSP – Elasticity.

**Module: II** **(16 Hours)**

**Fundamentals of Amazon Web Services**

Introduction to Amazon Web Services, AWS Global Infrastructure, Multi-Factor Authentication, AWS IAM, Network ACL, Introduction to Block & Object Storage Mechanism, Introduction to Elastic Block Store, Resource Level Tags, Detailed Billing Report with Tags, Auto Scaling, Introduction to S3, Glacier, S3 Lifecycle Policies, Introduction to Relational Databases, Understanding NoSQL Databases, Virtualization, Benefits of Virtualization, Virtualization Models, Types of Virtualization, Methods of virtualization

**Module: III** **(16 Hours)**

**Working with Monitoring and Serverless services**

Understanding CloudWatch, Understanding Simple Notification Service, Introduction to DNS, Understanding Route53, Understanding VPC, Understanding Serverless Architecture & Lambda, Getting Started with AWS Lambda, API Gateway, Build a Simple Serverless Website with Route 53.

**Module: IV** **(16 Hours)**

**Understanding AWS Databases**

Introduction to DynamoDB, Create and maintain database table using AWS DynamoDB Scan vs Query API Call, Fundamentals of AWS RDS, MySQL, Aurora, Connecting to RDS via CLI,.

**Fundamentals of Key Management Service**

Introduction to Key Management service, KMS API Calls, AWS SQS, AWS Simple Notification Service

**Module: V** **(16 Hours)**

**Understanding Content Delivery Network**

Introduction to Content Delivery Networks, Understanding Edge Locations, Deploying CloudFront Distribution, Understanding CloudFormation, Amazon Rekognition, Overview of AWS ElasticBeanstalk, AWS CodeCommit, Business Intelligence and Data Warehouse

**Billing & Support Services**

AWS Well-Architected Framework, AWS Personal Health Dashboard, AWS Pricing Model, EC2 Pricing in Detail, AWS Support Plans, The TCO calculator, AWS Whitepapers & Documentations, AWS Organization & Consolidated Billing

**Module: VI** **(18 Hours)**

**AWS Security Aspect**

Understanding Shared Responsibility Model, Understanding principle of least privilege, Identity& Access Management, AWS CLI, IAM Role, Compliance, PCI DSS Compliance, AWS Artifact, AWS Trusted Advisor, Understanding CloudTrail, Understanding AWS Inspector, Real World example on DOS Implementation, AWS Shield, AWS Direct Connect.

**Module: VII** **(18 Hours)**

**Fundamentals of Migration strategies**

Migration Strategies, AWS Import/Export, AWS Snowball, Understanding Data Pipeline, Deploying first job with Data Pipeline, VM Ware vs Center Migrations, AWS Server Migration Service

**AWS Networking**

AWS Global and Regional Infrastructure, VPC and Basic Networking Design, Elastic IP & Internet Gateway (IGW), Security Group & NACL

**Web References:**

1. www.amazon.com
2. www.aws.amazon.com
3. www.aws.amazon.com/education/awseducate
4. www.aws.training.com